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CONTENTS

ILLUSTRATIONS:	PAGE	GENERAL NEWS:	PAGE
A Water Supply for Jersey City.....	540	Car Building.....	552
A Combined Rock and Adhesion Locomotive.....	541	Bridge Building.....	552
Mr. E. F. C. Davis.....	543	Meetings and Announcements.....	552
A Railroad Track Maintained by Electricity.....	544	Personal.....	553
The Moran Flexible Steam Joint.....	545	Elections and Appointments.....	553
Regulating Valve for Direct Steam Pressure.....	549	Railroad Construction.....	553
The Armstrong Tool Holder.....	549	General Railroad News.....	554
		Traffic.....	554
		MISCELLANEOUS:	
CONTRIBUTIONS:		Technical.....	550
Mill Inspection and the Carnegie Circular.....	539	The Scrap Heap.....	550
Electricity or Steam.....	539	Train Policing.....	540
How to Get Your Car Couplers.....	539	Malleable Cast Iron.....	541
		Tests of Fire-Proofing Materials.....	543
EDITORIALS:		Recent Advances in Iron and Steel Prices.....	544
Electricity and Credulity.....	546	Trolley Competition in Connecticut.....	544
		Renewing Old Steel Rails.....	545
EDITORIAL NOTES.....	546, 547	Something New in Copper.....	548
New Publications.....	548	A New Boiler Cleaning Compound.....	549
Trade Catalogues.....	548	Principles of Block Working.....	549
GENERAL NEWS:			
Railroad Law.....	552		

Contributions.

Mill Inspection and the Carnegie Circular.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The recent circular of the Carnegie Steel Co., relative to inspection of material, before its arrival at the shipping bed is only in line with their past action preventing proper inspection. This last action makes inspection either a physical impossibility or a farce. Under the inspectors' acceptance or rejection stamp must be applied immediately after surface inspection, as it would require a second handling to affix it later on. But material cannot be accepted until it shall have been tested. But as entire lots of material are often rolled and are cold before the test pieces are even ready for testing, it becomes often impossible to test the quality until a sufficient time might have elapsed to have loaded it. It is a notorious fact that the Carnegie mills have inadequate laboratory equipment, for this very fact compelled them to break from 40 to 60 pieces per hour! This inadequate equipment also was the original cause of speeding up testing machines, to the extent as now done at the Carnegie works. At the Cousett Plate Mills in England, however, the same speed was obtained on a Wicksteed machine some years ago, and is now maintained, but there, tensile strength alone was measured, and rapid work on the Wicksteed machine does not vitiate results appreciably. After the qualities of material are proved satisfactory, then the individual pieces should be examined for correctness of shape, finish and accidental defects, any one of which may be sufficient for rejection.

It must be patent to all that as mills run night and day and are but very poorly lighted by night it is absolutely impossible to inspect material properly after dark. Moreover the material in the larger mills is all handled so hot that the workmen must use leather pads on their hands to avoid burning themselves. Pieces are also kept moving so fast in many mills that they cannot be examined between machines. It would be more costly to the mill to provide labor anywhere inside the mill to properly handle material for inspection, than in the yard or at shipping point. It would also be impossible to separate accepted from rejected material while en route to shipping beds, because the few rejected pieces would either blockade the skids or tracks on floor, either of which would soon stop a mill completely.

Failure to separate defective pieces immediately always causes trouble, as the most ignorant laborers only are used to handle material, and they see and hear nothing, and speak the Slavic or Czech dialects only, never English. Hence eternal trouble would arise, if separation of good and defective material were attempted inside the mills.

Now, it is apparent that an inspector cannot examine and measure material while hot, as it requires micrometers to do this, as the allowable limit of error in weight is 3 per cent.; hence, measurements of great nicety must be made, if they are to be of value, as 3 per cent. of $\frac{3}{4}$ in. = .022 in. It also becomes necessary to examine apparent defects, approaching them very closely; this cannot be done when hot.

Another point must also be considered, and it is the capacity for work of one inspector which often equals the total output of four roll trains for 24 hours each, requiring the assistance of only a few laborers. If there must be an inspector for each roll train constantly during the 24 hours when in operation, it would require 12 inspectors to be on hand to do the work of one able man. Now the recent Carnegie order will require the constant presence of one inspector for each roll train kept running, or three men working in eight-hour shifts. Let me ask is it fair to contracting parties or buyers to be forced to pay salaries for 12 high-priced men, when the mill would only have to add to their cost price the cost of labor of a few men receiving the lowest wages paid? It is customary in estimating the pound price of material to include the amount of labor

to handle the material until placed on cars; hence this cost of extra (?) labor cannot be the reason for the recent order. Every mill knows precisely what it cost to handle material once for inspection; past experience has proven this. The cost of extra yard room, appliances, etc., etc., if any are required, are also well known. Therefore every item entering into cost of testing and inspection is known by the mill and is charged against cost of production, which is the basis of all market or contract prices. Now as the consumer pays for it, or if he does not, it is certainly bad management, chargeable to the management alone—has he not the right to insist upon what he pays for? The captiousness or other undesirable qualities of inspectors do not come into question, as mills have the right, and use it, to refuse to submit to incompetent inspectors, and are justified in demanding their dismissal. My own experience is, however, that captiousness and incompetency is generally found in the mill managements or their menials executing orders blindly, just as much or more than in inspectors, and most troubles arising between the two are generally due to overbearing, dictatorial or worse behavior of officials, whose main title to hold their positions is based on their capacity of browbeating inspectors and often—only too often—"Chief Engineers", who are not familiar with the operation of mills. The latter will often sacrifice everything, even safety of structures, to avoid having a disputed point referred to the Board of Directors under whom they hold their office, or to avoid delay in the completion of a structure. It seems to me that the result of this new rule will be, that the relations between mill and inspector will be cleared and improved, but that those engineers who have any backbone will have their work inspected at the bridge shops, and the others will be forced to accept their work after a farcical inspection, which will be neither more nor less than a crime.

Does any engineer suppose for one moment that the "inspection certificate" furnished by the mill, insures that each and every piece has been carefully examined by a competent man? Is it not absolutely certain that the mill inspector will work entirely and only in the interest of those who pay him, and that if he does not do so he will be discharged? AN INSPECTOR.

Electricity or Steam?

NEW YORK, Aug. 10, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Please read the following from one of the most responsible of your New York daily contemporaries:

The industrial alliance, or combination, into which the Westinghouse Electric Company and the Baldwin Locomotive Works have entered, is very significant of impending revolution in the methods of transportation and travel. It seems to indicate that economies long anticipated in theory have been realized in part, and that our existing railroads will presently enter upon the great work of substituting stationary for movable sources of power. For this, alter all, is what is involved in what is commonly spoken of as the substitution of electricity for steam. Really what is substituted is the stationary boiler and engine house for one that travels about on wheels. Instead of generating the power required to move every train of cars in immediate connection with that train, the power is to be generated at one spot, and drawn off where and when it is wanted. Perhaps the time may come when our magnificent locomotives, the pride of our ablest mechanics, will be contemplated by posterity as curious instances of misapplication of power and waste of fuel. Already, when we compare the noiseless flow of energy through a slender wire with the terrific waste of hurling through space a locomotive weighing 100 tons, we seem to feel that the old order must soon change. The possible economies in the wear of machinery and bridges and track are so great as to make it seem necessary that they should soon become practicable.

It is amusing to learn that a boiler and engine house are "sources of power," but that is an inaccuracy of language common enough and perhaps not important.

You will observe that the important detail of tractive force, depending, so far as we are able to learn, directly upon the weight of the locomotive supported on its drivers, is to be contemplated by our posterity as a "curious instance of mis-application of power and waste of fuel." How this is to be replaced we are not told, but we presume by an independent motor on each axle of the cars in which case we shall probably have the curious sight of a stream of cars running on our trunk lines at a speed of 100 miles per hour (for of course your E. C. would not be satisfied with anything slower) and under a headway of say 30 seconds!

"The possible economies" in maintenance so delicately suggested seem still more remote although we are all ready to welcome them when they come.

How a simple arrangement between two organizations to assist each other when their interests lie in the same path, can be tortured into the promise of a great industrial revolution I do not quite see, but it is your duty to make plain some of the fallacies contained in the above editorial.

LUKE FORWARD.

[Bless your heart, what have we been doing the last two or three years but exposing those fallacies? You must run mighty fast to keep up with the vast and varied misinformation of the able editor.—EDITOR RAILROAD GAZETTE.]

How to Get Your Car Couplers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A big railroad recently sent out the following circular letter to the M. C. B. coupler trade:

I have been asked by many car coupler manufacturers to give them an opportunity to show by a practical test

on our line, the merits of their couplers. I am willing to make a test of couplers on the following basis:

Each of several manufacturers (to be designated by me) to furnish this road with 200 couplers, to be delivered at —, in the month of September, 1895; we to apply the same to cars at our convenience, putting in service as nearly as is practicable, the same number each month of each style of coupler. These couplers to remain in service until the average service is one year for the entire lot; bills to be rendered when couplers are shipped, but with the understanding that they are not to be paid until couplers have rendered an average of one year's service, and not then, except for such couplers as still remain in service in good condition, and we to have the privilege of returning to you, all your couplers if we prefer to do so, in which event, no payment is to be made by us. I will expect also, an agreement that you will replace, free of charge to us, without any expense either for freight charges or otherwise, such couplers as may break or fail in service during the first two years, after their application to cars, resulting from any defect in material or workmanship; and that for the same two years and thereafter, you will replace couplers or knuckles which may break (except as a result of usual and legitimate wear) on following terms:

A new head for a broken one, or major portion thereof, and \$4.

A new knuckle for a broken one, or major portion thereof, and \$1. The delivery of the new heads and knuckles, and of broken ones, to be made at — or —.

If you desire to ship us 200 couplers upon the terms herein set forth, please advise me; stating your price, the kind of material of which your coupler is made, namely, cast steel, malleable iron, wrought steel, etc., the weight of the knuckle, the weight of the entire coupler, including the knuckle, and the name of the manufacturer of the couplers.

Please do not consider this an order.

I call this hard cheek. I think it would keep us all guessing for a long time to select the party who would make, at the present day, any endeavor to meet its remarkable requirements. Pope, or some other clever man wrote years ago a couplet that is something like this:

"A sea horse when seen in the sea, a sea horse must be,
But when seen in the bay, a bay horse is he."

I imagine that any particular lot of 200 couplers that goes to this particular road under the terms above given will find itself in the very uncertain condition of mind as to its location and condition that the sea horse is.

M. C. B.

A Water Supply for Jersey City.

The Rockaway & Hudson Company is the lowest bidder for the new system of water-works proposed for Jersey City, N. J. It proposes to take water from the Rockaway River watershed, building a plant capable of delivering 50 million gallons per day, with necessary storage space for preserving the needed head in dry weather. The company will surrender all rights to any water over 50 million gallons per day which may be stored in the 118 sq. miles tributary to their proposed intake. The contract price for a two-pipe line from the intake at Boonton to Jersey City is \$5,943,000, and for a single pipe \$5,650,000. The company offers to charge a fixed sum per annum for each year the contract shall run, covering interest, maintenance, and a certain sum to be set aside for a sinking fund, such sum to be allowed to accumulate. When the city exercises its option to purchase the system at the prices named this fund becomes its property. Should it not accept the work the fund is to revert to the construction company as a security for its outstanding construction debt, at the expiration of the 25-year contract.

Jersey City now requires about 22 million gallons per day, rising in cases to probably 25 million. Taking the annual increase at 3 per cent., the daily consumption in 1898, when the new works are to be in operation, will be 24 million, and in 1905, 29 million gallons.

The plans of the company comprise a dam across the Rockaway River, near Boonton, an intake, from which water is to be piped three miles to a reservoir located in the ravine a short distance north of Montville Station, on the Delaware, Lackawanna & Western (see map), and 22 miles of pipe line to Jersey City. The dam at the reservoir near Montville is designed to be 1,500 ft. long, 70 ft. high at the middle, and to impound over 2,000 million gallons above the draught line, 55 ft. below the normal water surface. The gatehouse here will be so arranged that water can either be drawn direct from the Boonton intake or from the reservoir as desired. The pipe line is to end at the high-service reservoirs on Bergen Hill, Jersey City. Storage is to be provided in the upper valley for the 5,000 million gallons required by the specifications, independent of the 2,000 million gallons at Montville, and more, if it is necessary, to keep the required supply during the driest weather.

The Montville reservoir is designed to store only one inch on the whole water shed of 118 sq. miles. Its situation is such that the surplus flow of the river could be turned into it at the most advantageous seasons for obtaining the finest water, and it may be drawn upon when the river water is charged with sediment, as after a freshet, etc. At the same time, the plan offers a supply drawn directly from the running stream, which is kept full in a dry season by reinforcement from the upper storage, and provides from 40 to 50 days' full supply of selected water for an emergency.

The proposed pipe lines consist of two 48-in. steel riveted pipes, or one 60-in. pipe, between the intake and Montville, capable of delivering at the reservoir there about 40 million gallons surplus over the 50 million required per day, or more if necessary. The delivery pipes to Jersey City to be either two 36-in. pipes or one 51-in. pipe. The

pipe will be furnished by the Maryland Steel Co. and the Pennsylvania steel Co. The specifications are in advance of those usually furnished for city water supply pipe and are as follows:

- (1) The steel shall be of the class termed "soft," and shall be made by the open hearth process. It shall contain not more than 0.05 per cent. phosphorus, and 0.06 per cent. sulphur, and 0.60 per cent. manganese.
- (2) Chemical analysis of each heat or melt shall be made by the manufacturer at the contractor's expense, and properly certified copies of the final analysis of the material shall be furnished as the work progresses.
- (3) Physical tests to determine the tensile strength, elastic limit, elongation, softness and ductility of the material of each heat or melt shall also be made at the contractor's expense by experienced inspectors. For the purpose of identification, the heats or melts shall be numbered consecutively,

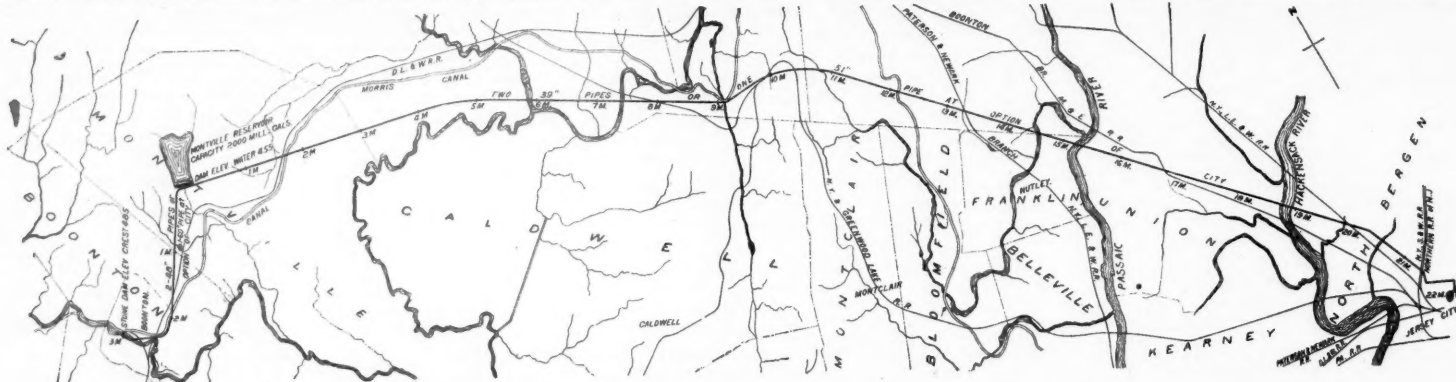
less than 55 per cent. of the required thickness shall be rejected without appeal; furthermore, at least 90 per cent. of the plates must be of full required thickness at all points. Said plates shall be rolled as flat and sheared as accurately as good mill practice will permit, but in no case shall they be scant of the prescribed or intended dimensions and must be in all respects of a good merchantable condition. The engineer, or his inspectors, shall have the right, at all times, to inspect the manufacture and testing of any and all plates, and shall have, if so required, one-fourth of the number of test pieces to be prepared as above, to test or to have tested under his own supervision, and at his own expense.

(10) It is further understood and agreed upon that any plate that shows any defect during the process of punching, bending and riveting for manufacture into pipes shall be rejected, notwithstanding that the same may previously have been satisfactorily tested.

All plates and rivets must be free from rust and be kept under cover, from time of manufacture of the plates until the

Train Policing.

This is the title of a paper read at the last meeting of the Central Association of Railroad Officers by Mr. C. A. Wilson, General Superintendent of the Wheeling & Lake Erie. Mr. Wilson starts out with a rehearsal of the ordinary rules governing the conduct of conductors and discusses the means of securing the most thorough obedience to them. The fear of being looked upon as a tale bearer prevents many men from reporting infringement of rules by others. It is important to inspire in men a spirit of conscientiousness. The name of an informant should never be divulged; teach men to acknowledge



Map Showing the Route of the Pipe Line for the Proposed Jersey City Water Supply.

and the corresponding number stamped upon each plate or sheet produced therefrom. The test specimens shall in all cases be taken from the hearing of at least 20 per cent. of the plates produced from each heat or melt, such plates or sheets to be selected at random by the engineer or his inspectors, and properly certified copies of the records of such tests shall be furnished as the work progresses.

- (4) Tensile test specimens to be 8 in. long and 1 1/4 in. wide between measuring points. Tensile strength to be between the limits of 55,000 and 67,000 lbs. per square inch. Elastic limit to be not less than 30,000 lbs. per square inch. For plates 3/4 in. thick or more the elongation to be not less than 25 per cent. longitudinally of the plate and 22 1/2 per cent. transversely of the plate. For plates less than 3/4 in. and not less than 1/2 in. thick elongation to be not less than 22 1/2 per cent. longitudinally and 20 per cent. transversely of the plate.

- (5) Bending test specimens cut lengthwise or crosswise from the sheet to be 6 in. long and 1 in. wide, to be bent 180 degs. upon itself when cold, and hammered down flat, without sign of fracture on the outside of the bent portion.

- (6) Punching test specimens to be 1 1/4 in. wide, and not less than 10 in. long, in the middle of which a row of not less than 3 holes, 3/4 in. in diameter, spaced 1 1/4 in. between centers shall be punched without causing any cracks.

completed pipe is dipped and coated. At the factory the plates must be loaded under cover upon suitably covered cars; they must be delivered under cover at the pipe shop, and must be kept under roof and cover until ready for shipment, and in no way exposed to the weather or moisture. In case of accidental rusting, the rust must be removed from the plates before proceeding with the manufacture of the pipe.

The Montville dam, shown in the engraving, is to be constructed of earth, faced with puddle and spall pavement in concrete. Inner slope 3 to 1; outer slope 1 1/2 to 1, broken by three tables or steps making the actual slope 2 to 1. The soil at the site furnishes an excellent mixture of clay and gravel suitable for the work.

Two 48-in. inlet pipes and two 39-in. outlet pipes will be carried through the dam in solid masonry surrounded by puddle and all the appurtenances will be of the very best class of work.

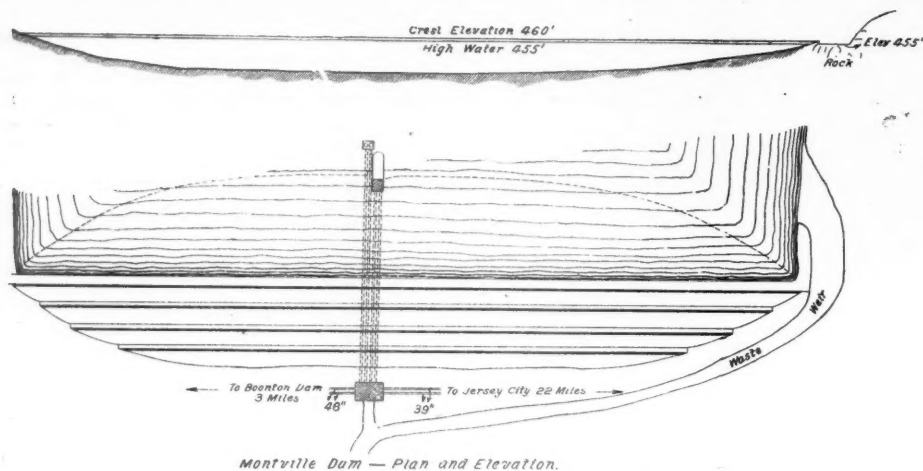
The Rockaway & Hudson Co. proposes to vest the city

their own errors. Punish the fault of the confessor lightly; but men detected, without admission, with severity. Set a premium on veracity.

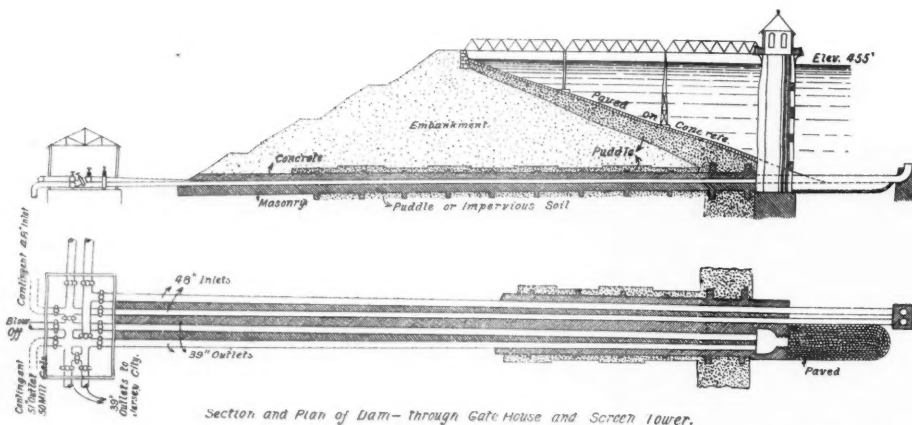
A record which shows the character, habits and general conduct of employees will be found useful in encouraging them to perform conscientiously the duty prescribed under Rule 4 of the Standard Code, if such record contains memoranda to the credit of the employee for all frank confessions of his own faults, and reports of the neglect of others to properly perform their duties. This has been my experience.

Better service could be obtained if the conductor of a train was made the superior in rank, and given authority over all the men on the train, from the engineman down.

If there is a desire to make the conductor fearless in carrying out instructions he should be encouraged and thoroughly upheld in his insistence upon ready response to his demands upon all other employees on the train. He should be supported and protected, if, in the performance of his duty, he acts according to his best judgment,

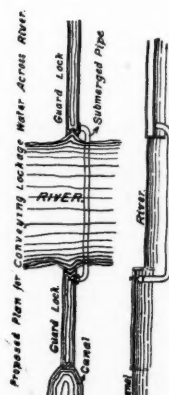
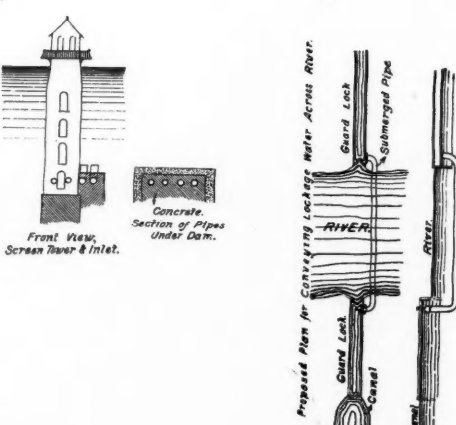
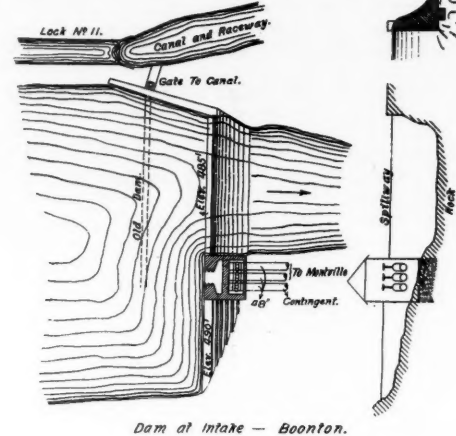


Montville Dam — Plan and Elevation.



Section and Plan of Dam—Through Gate House and Screen Tower.

Details of Dam Construction—Proposed Jersey City Water Supply.



- (7) Drifting test specimens to be 3 in. wide, and not less than 5 in. long, in which not less than two holes 3/4 in. in diameter, spaced 2 in. between centers, and 1 1/4 in. from edges, shall be punched and then enlarged by blows from sledge hammer upon a drifting pin until such holes are at least 1 1/4 in. in diameter without causing any cracks. Such enlargement to be done cold.

- (8) The plates must also admit of cold hammering or scarfing to a fine edge at the laps without cracking, and the test pieces must, furthermore, withstand such quenching, forging and other tests as may suffice to exhibit fully the temper, soundness and fitness for use of the material. The failure of a drifting test specimen, when taken at random as aforesaid from the finished product of any heat or melt, to conform to the above requirements, will be sufficient cause for rejection of the entire product of such heat or melt.

- (9) The plates shall be free from lamination and surface defects and be fully up to the required gage for thickness on the edge. Any plate whose thickness at any point may be found

with the fee of the land and water rights of the J. Couper Lord estate at Boonton, 100 acres, extending on either side of the Rockaway for a mile or more above and below the intake, and covering a fall of 112 ft. It is one of the most valuable water powers in the state.

The chief engineer of the company is E. W. Harrison, Fuller Bldg., Jersey City. The contract is not yet let, although the Street and Water Commissioners on Tuesday awarded it to the Jersey City company at their bid of \$7,950,000. This contract must be approved by the Board of Finance, which is reported to be against awarding the contract to any but the lowest bidder, except on the approval of an expert appointed by the city.

though at times he may err in its exercise. . . . Trainmen and enginemen should conduct themselves respectfully and in a decorous manner; improper, vulgar and obscene language should not be indulged in.

There is a great number of idle men now loose upon the country, but the railroad which will vigorously enforce its regulations and the laws of the state as to free riding on freight trains, by disciplining trainmen, arresting and prosecuting culprits, even although it may be at some expense and trouble at first, will soon become known as a road to be avoided.

The management of a railroad is probably judged more by the manner in which its passenger trains are conducted than by any other standard. . . . So careful is one large road in this respect, that it seems as if it were carried down to the very intonations of the brakeman as he announces the next station, and with such

similarity of detail that it could scarcely be told from the appearance of the train or the conduct of those on the train, whether you were riding along the Atlantic coast or along the Mississippi river.

A rule on almost every railway reads: "Conductors should require a ticket, pass or cash fare from every person on the train." How many railroads are absolutely enforcing this rule? I venture to say hardly one in a hundred. Precautions should be taken to provide all persons who should ride free with some form of transportation so that the conductor can be confined to the limit of his restrictions, or relieved of the exercise of any assumed privileges. Time passes should be distributed to all employees whose duties compel them to ride over the road in their performance. Act promptly in furnishing some form of transportation to those whom an emergent duty has compelled to take the train without being able to have obtained the proper transportation such as a form of telegraphic pass countersigned by the agent. Such transportation should, after receipt at headquarters, have careful scrutiny to prevent abuses.

An arrangement should be made for immediate refunding of fares collected from privileged passengers. Discipline employees who improperly use pass privileges. Treat the recipient of free transportation by the favor of the conductor, unauthorized, as a confederate of the conductor. The law treats the one who offers a bribe the same as he who accepts it. Men's consciences are not always what we would like them to be. Opportunity often makes the thief, therefore remove as much as possible the opportunity. A party who frequently rides without the prescribed form of transportation is the brother employee of the trainmen, belonging to a foreign road, who applies to the conductor or engineer for a free ride. Your conductor or engineer may be thoroughly honest, loyal and true in every other respect, but he will not put off his train, or make pay his fare such a petitioner. The man who takes all the chances, of course, is the conductor, but he does it rather than be dubbed a "mean man." How many superintendents will discharge a conductor, even with absolute proof, for carrying the conductor of another railroad without obtaining from him the proper form of transportation? This question presents itself, it seems to me, as the most difficult one in enforcing police regulations. Why not legalize under proper restrictions what confessedly is known to exist?

trains without any regular form of transportation over two different railways before he reached us and over one after he left us, reached his destination and secured employment. I believe ours to be the only road which has any record or knowledge that such passenger was carried, and I would like to ask what you would do in such cases to enforce the rules and discipline the men for carrying him free.

It is not found by experience with the use of this form that any large number of them are received; in fact, it is by far the least in number of the various kinds of free transportation which are issued. At first there will be a disposition on the part of the men to be too free in its use, but it will be soon found that it has its responsibilities, and after a few cases of the enforcement of the agreement contained in the request, it will be noticed that its use is receiving as much care and consideration at the time it is issued as if the men themselves were clerks to the General Superintendent, and the instances will become more rare where they issue one to strangers, even although the strangers may present what otherwise would be considered by the ordinary employee as good evidence. The use of this form, however, cannot be made successful unless we are able to obtain full answers as to the standing of the recipient of the favor of free transportation, and great reluctance will be found to concede this information. Its use should not be consented to without such feature.

This departure from common practice should be in no way to inculcate to favor labor organizations or in any way to acknowledge their influence. I state this because it has been intimated that the use of this form was "a peace offering to the Grievance Committee."

The application of the Golden Rule will do much to retard the influence of the Grievance Committee. Grievance committees owe their existence perhaps to some extent to the apparent need for protection against the partiality of favoritism or the private influence of those in power. Be just. Permit no influence but that of the character, ability and fitness of the employee to be brought for his advancement or degradation. Be firm in this and unselfish enough to risk in carrying out such resolve your own sacrifice, and when the employee understands this he will learn to rely upon himself, and the Grievance Committee will little trouble, or be troubled. The principle of love, of noble character, regard for our fellow man, should be the ideals. It may be claimed

General Dimensions.	
Wheel base, total, of engine.....	9 ft. 0 in.
" " driving.....	3 ft. 7 in.
Height, limit.....	12 ft. 8 in.
Width, limit.....	10 ft. 8 in.

Wheels and Journals.	
Adhesion drivers, number.....	4, and 2 carrying wheels
" " diameter.....	33 in.
" " material of centers.....	Cast iron, 29 in. diam.
Carrying wheels, steel tired, diameter.....	25 3/4 in.
Journals, driving axle, size.....	8 in. diam., 6 in. long
" " carrying wheels.....	6 in. diam., 6 in. long
Rack wheel, diameter.....	22 1/2 in.
" " center.....	15 1/2 in., steel, forged on axle

Cylinders.	
Cylinders, compound, diameters.....	H. P. 8 in., L. P. 13 in.
" " simple.....	11 in.
Piston, stroke.....	13 in.
Kind of piston-rod packing.....	U. S. metallic packing

Valves.	
Valves, kind of, S. E. cylinders.....	Slide
" " compound cylinders.....	Piston

Boiler.	
Boiler, working steam pressure.....	180 lbs.
" " material in barrel.....	Homogeneous cast steel
" " thickness of material in barrel.....	3/8 in.
" " diameter of barrel, smokebox end.....	42 in.
Scams, kind of, longitudinal, butt jointed, with double covering strips.....	1/4 in.
Thickness of flue sheets.....	3/8 in.
" " crown sheet.....	1/2 in.
Crown sheet supported by radial staybolts.....	1 1/4 in. diam.

Tubes.	
Tubes, number.....	94
" " material.....	Iron, with copper firebox ends
" " diameter.....	2 in.
" " length.....	11 ft. 10 in.

Firebox.	
Firebox, length.....	4 1/2 in.
" " width, inside.....	13 1/4 in.
" " material.....	Copper
" " thickness of sheets, side and back sheets.....	3/8 in.
" " brick arch.....	On studs
" " water space, width, front, 3 in.; sides, 2 1/2 in.; back, 2 1/2 in.	

Other Parts.	
Smokebox, extended, with netting, deflecting plate and handhole.....	
Stack.....	Straight, with steel base and copper top
Crossheads, rack cylinders.....	Steeled cast iron
" " adhesion cylinders.....	Cast steel
Ashpan.....	With double dampers
Injectors.....	Two Sellers, No. 6 1/2

Malleable Cast Iron.

Malleable cast iron has become one of the most important and interesting materials of modern manufacture, and yet it is so recently that the use of it has become large that accurate information concerning its treatment and its properties is difficult to get. One of the papers presented at the annual convention of the American Society of Civil Engineers was that by Mr. H. R. Stanford, of Buffalo, Associate Member of that Society, under the title of "Notes on Manufacture and Properties of Malleable Cast Iron." A number of our readers have asked why we did not publish this paper. The regulations of the American Society of Civil Engineers prohibit publication of papers before their appearance in the *Transactions* of the Society, other than the official abstract given out for publication. The appearance of the paper in the July issue of the *Transactions* removes the restriction and we now give it nearly in full, but have summarized the tables so far as possible.

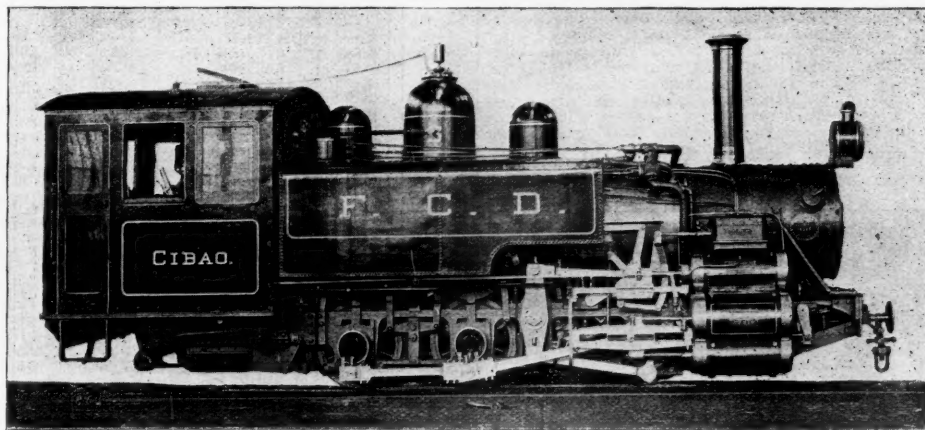
If any systematic and scientific study has been made of malleable cast iron, the results have been very carefully kept private. . . . In the hope of arousing ideas and discussions on this by no means simple and unimportant industry, the following methods and opinions are submitted.

Malleable cast iron is made principally from charcoal pig iron and a percentage of scrap or sprue sufficient to use the culled work, gates, runners and shrinkers that may result from the continued application of the process. After analyzing a number of kinds of pig iron the author was led to believe that coke pig iron might just as well be used as charcoal pig, and developments have fully justified the assumption. The main difference between charcoal and coke pig iron is in the percentage of sulphur and in the cost; but if a good quality of coke is used the sulphur is not high enough in the coke iron to affect its use. In table No. 1 are results of chemical analyses and of physical tests of bars made from the different pig irons, and upon those results the use of charcoal iron was discontinued when the iron in stock was used.

Sprue amounts to from 20 per cent. in heats for coupler or heavy work to 40 or 50 per cent. in light carriage work. An addition of 4 per cent. of heavy annealed scrap was introduced very successfully into all charges, and a large accumulation of the cheap and undesirable iron was disposed of. As much as 18 per cent. of annealed and broken couplers was tried experimentally in a charge for coupler heat, and the resulting material was excellent as far as quality was concerned, but the surfaces were not smooth and gave an impression of pock-marks. As annealed scrap can be secured at \$4 per ton, and as a great many will take no exception to a rough-looking casting if of good quality, it seems as though there might be a use for the piles of broken couplers which a day's ride can hardly help revealing.

The furnaces used in melting malleable cast iron are cupolas and open-hearth furnaces. The open-hearth furnaces which the author has used are of two types, a straight forced draught furnace, using a good hard, close, bituminous coal as a fuel, with an air pressure of 4 or 5 oz., and a Siemens-Martin furnace, using oil as the fuel.

The manipulation of the charge in the oil furnace was practically the same as in the coal furnace, and the times for melting and heating were also nearly the same. About one hour and a half was required to melt completely 6 tons, the solid masses being shifted to hurry the melting. After the charge was melted, it was frequently rabbled, and the surface skimmed clean of all slag after the first good rabbling. Just before tapping, a second skimming was made. Two tests were made before tapping a charge; the first to see if the iron was "high enough," that is, to see if in the heaviest form into which it was to be poured the carbon would be practically all in the combined state. The determination for a charge for ordinary heavy castings was made by dipping out a little of the iron and pouring a bar about 4 in. long and 1 in. in diameter, and, after it had set, cooling it carefully in water. If cooled too rapidly, the



Combined Rack and Adhesion Locomotive for the San Domingo Improvement Co.

Having arrived at such conclusion I would adopt the following form [with a suitable stub]:

To.....

General Superintendent..... No.....

I recommend that free transportation be accorded to

Name..... From..... Station

Occupation..... To..... Station

Name of road now or last employed On Train.....

..... R. R. Date..... 189.....

And I certify that the above named party is in good standing as a railway employee, and if such is found not to be true, I agree to pay his fare.

Accepted for passage.....

..... Conductor.

Agents, Conductors and Enginemen can sign Certificate. Train Conductors will endorse "accepted, etc.," and turn in with trip report to Auditor.

Every person authorized to issue the foregoing form is made to realize that he assumes the responsibility of those entrusted with the issuing of free transportation. It also places the responsibility where it belongs. The conductor is not importuned by this friend and that one to carry Tom, Dick or Harry. His reply is, "Well, here is a yellow ticket; fill it out and I will accept it." In its use we should also recognize no class of employees or associated labor organizations. The transportation, if granted by the General Superintendent on the receipt of the form, is not accorded as a consideration to the road on which the passenger is employed, but as a favor to our own employee. These forms as soon as received by the Auditor are forwarded to the General Superintendent for endorsement. Before endorsing them, either as recognition for free transportation, or as a deduction to be made against the party issuing, we must determine as to the standing of the passenger as a railroad employee, and here will be found the principal difficulty. The Superintendent, who is asked about the standing of a man, is reluctant to give the information, because he does not want transportation granted to his men in this manner; it is not in accordance with the rules on his road. Or, perhaps, he will curtly reply, "not in our employ." But this feature has its merits, if our neighbors could but see it so; it places in their hands information as to the violation of their instructions relative to requesting transportation except through prescribed channels.

If it should be the aim to teach our employees to be frank, truthful and honest, there is a generous treatment contemplated by this form, which will assist in that direction. An employee in Pennsylvania was recently discharged, but such a good man did his employer consider him that he sent him with a personal letter of recommendation to another superintendent in Western Indiana. This man rode free on passenger

that these Christian graces are not practicable in the modern method of conducting business—that these principles may answer for the church and at home, but they are out of place in the workshop, the office and the counting room. Such a declaration is the supremest folly. These are the very ideals consistent with a successful career in the individual or the nation. None other is practicable. Intrigue, deception, dishonesty, overreaching in a bargain, temporarily have the glamor of success, but in the end will bring misery and disaster.

A Combined Rack and Adhesion Locomotive.

The illustration shows a locomotive recently built by the Baldwin Locomotive works for the San Domingo Improvement Co. The locomotive is intended for special service, the requirements being to haul 50 tons of cars and lading up a nine per cent. grade and a 100 meter curve combined.

The locomotive has three pairs of wheels for adhesion the forward pair being merely carrying wheels running loosely on the gear axle, and a rack wheel, the latter being driven by a single expansion cylinders, while Vauclain compound cylinders are provided for driving the adhesion wheels. The valves of the compound cylinders are actuated by Stephenson link motion, and the rack cylinders are worked by the Walshaert gear.

The rear drivers are flanged, they being 5 in. wide, with steel tires 2 in. thick. The main drivers are plain, with tires 5 1/2 in. wide. The Abt rack wheel is fitted with Abt's patent adjustment springs for rack service.

The cab is of steel, with trap ventilator. A valve is provided, operated from the cab, which regulates the back pressure escape from each cylinder, the escape pipe terminating in a Shaw muffler. Steam brakes are provided for the adhesion wheels, and a hand brake for the rack disk. The Le Chatelier brake is also used. Spring buffers, and screw couplings for use with English rolling stock, are provided at each end.

The tank which is clearly shown in the illustration, is of 800 gal. capacity. The general dimensions of the locomotive are given below:

Description.	
Type.....	Combined rack and adhesion
Name.....	Cibao
Name of builder.....	Baldwin Locomotive Works
Name of operating company.....	San Domingo Improvement Co.
Gage.....	2 ft. 6 1/2 in.
Simple or compound.....	Both
Kind of fuel to be used.....	Soft coal
Weight on drivers.....	69,000 lbs.
" " total.....	69,000 lbs.

shrinkage was such that nothing could be told by the fracture, but if properly handled, in four minutes from the time of dipping out the iron, the bar could be cast, cooled and broken. If the iron was "high enough," the fracture would be entirely white, but if not, there would be little spots of graphite about the size of the head of a small pin, and more or less numerous, depending upon whether the iron needed much more or little more time in the furnace. The second test was for fluidity, and was made entirely by eye, using blue spectacles for protection. If thin enough, the iron was a clear white; but if not it had a kind of dark hue not easily described. If the charge was intended for car couplers or other very heavy work, the test bar would be larger, or about 1½ in. in diameter. To secure thorough mixing in the furnace and to heat the hand ladles of the molders, the first ladle drawn by each molder was returned to the furnace through a side trough; but, notwithstanding the precaution, the mixing was very imperfect, as may be judged by a reference to the first form in Table No. 4.

The cupola was used very advantageously in connection with the open-hearth furnace. It was used for the

SUMMARY OF TABLE 1, COMPARING PROPERTIES OF MALLEABLE CAST-IRON MADE FROM CHARCOAL PIG IRON AND FROM COKE PIG IRON.

	From charcoal pig.			From coke pig.		
	High-est.	Low-est.	Average.	High-est.	Low-est.	Average.
Maximum strength per sq. in.	46,500	39,400	42,916	56,100	41,100	47,930
Per cent. reduction.	6.2	1.7	3.81	8.1	2.1	4.41
Per cent. elongation.	4.6	2.7	3.97	9.2	4.0	5.81

lightest patterns and for patterns where a uniformly superior metal was not of vital importance and for shapes in which a considerable shrinkage would not destroy all strength. The lightest patterns were placed under the cupola because the fluidity of the cupola metal was greater than that of furnace metal, due to the higher percentage of carbon which resulted from the contact of the iron with the coke fuel. Ordinarily, if the charge is properly introduced, the quality of the product is very good, but at times the iron is not mixed in going down the cupola, and gray castings result. The high temperature of the iron and the excessive hardness which was necessary to avoid gray iron in the heavier shapes made the shrinkage of cupola iron destructive to some forms; as, for instance, a corner iron. In the cupola a much larger percentage of sprue could be used than in the furnace, because of the recarburizing tendency of

SUMMARY OF TABLES 2 AND 3 SHOWING CHEMICAL COMPOSITION (UNANNEALED AND ANNEALED) AND PHYSICAL PROPERTIES OF MALLEABLE CAST-IRON.

	Unannealed or annealed.	Total carbon.	C. C.	G. C.	Mn.	Si.	P.	S.	Loss of carbon.	Maximum strength per square inch.	Per cent. reduction.	Per cent. elongation.	Hours annealed.
Average...	{ Sprue..... Annealed.....	3.14 2.45	2.93 0.23	0.21 2.22	0.26 0.26	0.64 0.61	0.181 0.181	0.016 0.016	0.69	49,100	4.2	5.2	119

NOTE.—The above test bars were all rectangular in section.

Average...	{ Sprue..... Annealed.....	3.04 2.66	2.85 0.31	0.19 2.35	0.21 0.21	0.73 0.72	0.154 0.153	0.050 0.050	0.38	49,510	6.23	6.61	103
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NOTE.—The above test bars were all cylindrical in section.

TABLE 4.—SHOWING VARIATION IN CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF IRON TAPPED FROM THE SAME HEAT BUT AT DIFFERENT TIMES.

Unannealed or annealed.	C. C.	G. C.	Mn.	Si.	P.	S.	Maximum strength per square inch.	Per cent. reduction.	Per cent. elongation.	Hours annealed.	Remarks.
Sprue.....	2.93	0.18	0.21	0.88	0.152	0.091	40,200	3.8	4.0	178	Poured from first ladle drawn from heat.
Annealed.....	0.38	2.41	0.21	0.80	0.156	0.091	39,800	3.4	4.0	"	"
Sprue.....	3.18	0.13	0.21	0.62	0.153	0.097	38,700	4.8	4.5	"	"
Annealed.....	0.08	2.17	0.22	0.64	0.151	0.096	42,100	4.4	4.0	"	"
Sprue.....	2.64	0.15	0.22	0.68	0.173	0.090	42,700	2.9	5.0	"	Poured from middle ladle drawn from heat.
Annealed.....	0.59	1.96	0.22	0.66	0.165	0.100	42,400	3.1	4.0	"	"
Sprue.....	2.64	0.15	0.22	0.68	0.173	0.090	42,400	2.2	3.5	"	"
Annealed.....	0.59	1.96	0.22	0.66	0.165	0.100	47,600	5.8	5.0	"	"
Sprue.....	2.64	0.15	0.22	0.68	0.173	0.090	50,700	4.5	5.5	"	Poured from last ladle drawn from heat.
Annealed.....	0.59	1.96	0.22	0.66	0.165	0.100	47,800	5.5	3.5	"	"
Sprue.....	2.64	0.15	0.22	0.68	0.173	0.090	51,900	5.7	5.5	"	"
Annealed.....	0.59	1.96	0.22	0.66	0.165	0.100	51,900	5.7	5.5	"	"

NOTE.—Second specimen in table broke in shoulder.

CHEMICAL COMPOSITION OF SKIN AND OF INTERIOR OF AN ANNEALED SPECIMEN.

Sample taken from.	C. C.	G. C.	Mn.	Si.	P.	S.	Hours annealed.
Skin.....	0.61	0.73	0.15	0.65	0.154	0.116	120
Interior ..	0.02	3.49	0.14	0.63	0.158	0.113	120

PHYSICAL PROPERTIES OF 0.8 IN SPECIMENS—SKIN REMOVED.

Days annealed.	Reduced diam. of test bar.	Max. strength per sq. in.	Per cent. reduction.	Per cent. elongation.
5	.618	44,200	Broke in shoulder.	
9	.613	41,500	1.2	2.5
5	.610	39,300	4.3	4.5
7	.607	41,200	2.1	3.0
9	.609	37,600	3.3	3.5

the fuel. A high percentage of carbon in the iron is necessary for fluidity and clean castings, and on the hearth the bath loses rather than gains carbon. Coke was used for fuel, and a small quantity of oyster shells or lime served to clean the iron and keep the cupola free from slag. About one-third of a pound of coke was used in melting 1 lb. of iron.

After chipping and sorting, the iron was taken to the packing-room where it was packed in pots for the annealing process. In order to avoid distortion or crooked work, and to get as much as possible in a pot, considerable care had to be exercised in the packing. Although the pots were jarred, and the packing consolidated as much as possible, there was always a further settling as the result of the heat in the annealing oven, and such a shape as a rim band for a buggy wheel, if placed with its axis horizontal would be flattened to an elliptical form; whereas if packed with its axis vertical, the band would settle with the packing and would not be distorted. Clean, heavy forge scales seem to make the best packing, everything considered.

According to all accounts of the manufacture of malleable cast iron which the author has been able to find, the packing must be an oxide of iron scale or some compound which, because of its chemical composition, with a cer-

tain degree of heat, can exercise a decarburizing influence upon the castings which it surrounds and so change the casting from a high carbon iron to a carbonless or wrought iron. The author's opinion is that the packing need not be necessarily a decarburizing agent, but that it should be of such a physical form that it will readily fill all small interstices between castings; that it should not fuse or slag under the temperature needed for annealing; that it should not adhere strongly to the castings or form into hard lumps increasing the cost of dumping and of tempering the packing, and that it should not be too expensive. The analyses and tests given in tables Nos. 2 and 3 are evidence that good malleable cast iron is not a carbonless iron. An effort to anneal a brake shoe, so that the surface would be part hard and part soft, led to some specially prepared pots in which black oxide of manganese, clean river sand and sand mixed with a large proportion of ferro-cyanide of potassium, were used respectively. In every case the iron was as soft and malleable as it could possibly have been by any treatment. . . . Oil was superior to coal as a fuel for the annealing oven, not so much from the standpoint of economy as because of its controllability and cleanliness. Low-pressure air from a Root blower atomizes the oil satisfactorily, and 100 gals. of oil per burner per day was about the consumption. The temperature maintained was a bright cherry, and was controlled by the eye through peep holes. Too high a temperature wasted the pots needlessly, burned the packing hard, and neither hastened nor improved the annealing of the iron. The time required to anneal iron varied more from the chemical composition than from the size or thickness of the piece, and ranged from 3 to 10 days, including the time necessary to raise the heat and cool the pots.

Combustion of the fuel in the annealing ovens should not be completed in the fire-hole, but by properly manipulating the chimney draft and the air supply, the mixed air and gas should slowly drift through the oven and combine as they come in contact with the red-hot pots. Uniformity of temperature throughout the oven is to be obtained only when the conditions are such that fuel gas is burned in all spaces in the enclosure.

The effect of composition on the time of annealing will be noticed later. A softer metal was obtained if the oven doors were allowed to remain closed for at least one day after the firing was stopped, and the scaling of the pots was much diminished. A day was sufficient to cool the pots with their contents to a black heat. Sometimes iron was packed in one large mass or bed, filling a part or the whole of the oven. The method effected a saving of pots, and cost no more in labor for packing, but was at a great disadvantage in time required to anneal the work thoroughly in, labor, unpacking and in the percentage of distorted pieces. A grade of iron requiring five days to anneal if packed in pots, would require seven days if packed in a bed. A per pound estimate of the productive cost of annealing

lows a wet tumbling, in tumblers through which is running a current of water, which thoroughly cleanses the surfaces, and finally a dry polishing tumbling with pieces of leather.

Next to iron, the most important element in malleable cast iron is carbon. A high percentage of carbon is necessary for fluidity; and fluidity is of prime importance, not only that the percentage of lost molds may be small, but that the iron may run clean and smooth, and the resulting work have a perfect surface. For strength and malleability the unannealed castings must have no graphitic carbon, but the total percentage must be in the combined state. With a given molten iron at a certain temperature if the iron be poured into a mold of a certain section the casting will contain all of the carbon in the combined state and the fracture of the annealed specimen will be of a uniform dark fibrous appearance. If the mold be of a smaller section the casting made from the same iron will show the total percentage of carbon as combined carbon, but there will be a surface chill, which in the annealed specimen will show as a white skin. If the mold be of a greater section, then the rate of cooling of the iron will be so slow that a part of the carbon will have time to separate from the iron as graphitic carbon, and will show in the

TABLE 5.—SHOWING VARYING PHYSICAL PROPERTIES OF MALLEABLE CAST-IRON TEST BARS DEPENDING UPON TIME ANNEALED.

Heat number.	Maximum strength per square inch.	Per cent. reduction.	Per cent. elongation.	Hours annealed.	Heat number.	Maximum strength per square inch.	Per cent. reduction.	Per cent. elongation.	Hours annealed.
276.....	42,000	4.1	6.0	79	275.....	42,100	6.0	7.5	152
	39,500	4.2	5.5	79		40,000	9.0	6.5	132
	37,200	3.9	5.0	79		38,800	8.3	6.0	192
	41,800	...	8.0	79		42,100	4.6	7.5	192
	39,600	4.3	5.0	108		41,200	6.4	8.5	216
	40,800	2.4	5.0	108		40,600	7.3	6.5	216
	41,800	3.5	6.0	118		36,300	6.0	5.0	216
	42,100	1.0	4.5	108		42,200	8.4	8.5	216
	40,200	7.5	8.0	192		46,800	3.9	5.0	120
	42,800	8.2	8.0	192		43,100	4.0	5.0	120
	42,300	7.9	9.0	192		41,500	120
	43,800	10.7	8.5	192		43,300	5.2	5.0	118
	39,800	7.9	8.0	216	67.....	42,300	3.4	3.5	168
	40,500	4.7	6.5	216		44,300	4.3	4.5	168
	38,100	6.6	7.0	216		48,900	5.3	5.0	216
	39,000	2.9	6.5	216		47,200	7.0	5.5	216
	44,000	7.7	5.5	72		48,600	6.7	5.0	216
	43,200	5.1	5.0	72		56,900	0.8	4.0	120
	42,900	4.9	4.5	72		55,500	4.2	5.0	120
	50,400	3.0	5.5	120		56,100	2.7	8.0	120
	49,100	3.5	5.0	120		59,600	5.3	4.0	168
	50,600	4.8	4.5	120	361.....	58,100	5.5	5.0	168
	48,800	5.7	5.0	120		52,100	1.6	2.0	168
	46,900	4.6	6.0	192		51,800	5.1	5.0	216
	47,700	3.5	5.5	192		52,800	4.1	3.5	16
	46,000	6.1	4.5	192		50,300	3.7	4.5	216
	44,500	5.7	5.5	192		50,700	5.9	8.0	120
	47,400	8.6	7.0	216		52,600	6.5	7.5	120
	47,300	12.6	7.0	216		52,700	7.3	8.5	120
	47,300	5.3	6.5	216		48,100	5.7	6.0	118
	40,400	5.7	7.0	79	362.....	58,000	4.7	4.0	168
	42,300	5.9	7.5	79		47,300	5.3	6.0	168
	42,800	2.8	6.5	79		46,700	5.1	5.1	216
275.....	44,300	2.4	5.5	108		47,500	3.8	4.0	216
	44,600	1.7	5.0	108		51,100	3.6	5.0	216
	43,500	2.2	4.5	108					

NOTE.—Where the percentage of reduction or elongation are not given the specimen broke in the shoulder. Bars 278 were poured from a cupola heat charged for light work, and showed gray in fracture before annealing.

fractured unannealed casting as scattered spots of graphite about as large as the head of a small pin, the number of spots increasing with the section of the casting. The above three castings if annealed, will show the following physical properties: The first will have an ultimate strength of from 42,000 to 46,000 lbs., and will stretch and reduce about 6 per cent., and may be considered a most desirable iron. The second will show in fracture a white crystalline skin, increasing in thickness as the section is lighter, with a black fibrous center; the ultimate strength will be about 52,000 lbs., and the stretch and elongation about 3.5 per cent.; if the section is so light that the whole fracture is white, then the iron will be very malleable and tough. The third casting will be little better than gray iron, with a strength of from 25,000 to 35,000 lbs., depending upon the percentage of graphite in the unannealed iron, and with practically no stretch or elongation.

In tables Nos. 2, 3 and 5, all specimens are examples of iron included between the limits of the first and second cases cited above.

From the nature of the material the test bars could not with justice be dressed. In the second form of Table No. 4 are given analyses of the skin and of the interior of a test bar showing the difference to be one of carbon. In the third form in the same table are given the physical properties of the interior of test bars of two different heats, the samples from the same heats differing only in time annealed; tests of untempered bars corresponding with the above may be seen in Table No. 5. The thickness of the skin of the test bars averaged about 1/16 in.

The chemical action in the furnace seems to be primarily the combining of the graphitic carbon of the charge with the iron, a combination made possible in the fused mass by the temperature; and secondarily a small burning out of carbon and slagging out of silicon and manganese. The secret of mixing is in using material containing combined and graphitic carbon in such proportions that at the temperature test adapted for pouring the graphitic carbon shall all have combined with the iron. . . . The definition might be given for malleable cast iron that it is essentially a mixture of metallic iron and graphitic carbon, the carbon being in finely divided or atomic particles and the iron being the matrix for these particles. Gray iron differs from malleable cast iron in that the carbon, instead of being in atomic particles, is in crystals, and these crystals cut the iron structure and make it discontinuous. In malleable cast iron the continuous cellular iron structure is responsible for the strength of the product and its malleability and ductility are limited by the non-deformable particles of graphite which occupy the cells. The process of making malleable cast iron is then first to make the hard brittle carbide of iron which is a stable compound at ordinary temperature. This step is possible because of the affinity of iron for carbon at high temperatures and the inability of the carbon to separate from the iron in the limited time required for the compound to cool in molds; and secondly, to change the carbon from the combined to the graphitic state by annealing. This step

iron, based on an oven heated by two oil burners, and with a capacity of 30 pots, each loaded with 800 lbs. of iron, is as follows:

Labor packing pots.....	.0117 cent.
Labor loading oven.....	.0025 "
Fuel (including air for atomizing and attending).....	.0938 "
Labor unloading oven.....	.0025 "
Labor dumping pots and picking out the iron.....	.0104 "
Labor tempering and handling packing.....	.1000 "
Pots.....	.1000 "
Scale for packing.....	.0208 "
Total.....	.2500 cent.

After being annealed the freshly dumped iron has a rich blue color which is probably given by a thin scale, and is entirely lost in the tumbling, which constitutes the last step in the process for making malleable cast iron. Upon the use which is to be made of the iron depends the details of the final process. For shapes where appearance is of little importance, a rough tumbling for a short time is sufficient. For pieces such as handles and buggy trimmings, which are placed in conspicuous positions and are sometimes tinned or nickel-plated, a further treatment is necessary. After the rough tumbling fol-

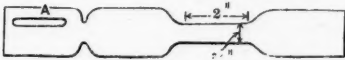
is possible because of the inability of the iron to hold carbon in combination if the compound is slowly cooled from a high to a low temperature.

Shrinkage is a function of casting temperature, and the nearer the iron is to the gray state and yet shows no graphite in fracture, the less will be the shrinkage. The normal shrinkage of hard iron is very nearly $\frac{1}{8}$ in. to the foot, and there is an expansion of about $\frac{1}{8}$ in. to the foot as the effect of the annealing process, so that the net shrinkage is about $\frac{1}{16}$ in. to the foot, or about the same as for gray iron. Inasmuch as shrinkage depends upon the condition of the carbon, and the condition of the carbon depends upon the section of the molds, and because abnormal shrinkage is so undesirable, the necessity arises for different mixtures for different patterns. The shrinkage of cupola iron prohibits its use for a great many shapes, because of the imperfect mixing that necessarily characterizes cupola melting and because of the factor of safety required in the charge to be sure of avoiding gray iron in the castings.

After carbon, sulphur is the next important element in malleable cast iron. Sulphur tends to hold the carbon in combination with the iron and gives a stronger product because of the semi-steel which it produces. Sulphur is undesirable because of the hindrance it offers to annealing. The shapes ordinarily made by this process need not have great strength, but it is desirable that they be soft and capable of bending, and that the time of manufacture and cost be as low as possible. To show how sulphur affects the time necessary to anneal, couplers which analyzed about 0.040% in sulphur and in which were sections about $1\frac{1}{2}$ in. thick, were thoroughly annealed in $3\frac{1}{2}$ days, while iron bands for buggy wheels, which were no more than $\frac{3}{8}$ in. thick and analyzed about 0.150% in sulphur, were invariably hard if given less than five days. If sulphur is carried as high as 0.200%, enough carbon is retained in the combined state to give to fractures a uniform crystalline appearance, and the method is employed to make a so-called hard or special steel. This product in ordinary sections does not anneal in less than nine days. Special pains should be taken when buying coke for cupola melting to get a coke low in sulphur, as the iron coming in contact with the fuel picks up sulphur, and delay in the annealing process, with the accompanying wastes, is the result.

The bars used for making the physical tests given in this paper were of two different kinds. For all heats bearing a number less than 361, the test bars were cast rectangular in section, 2 in. long between shoulders, and approximately $\frac{1}{2}$ in. thick and $\frac{3}{4}$ in. wide, and as shown in Fig. 4.

It being very unusual to machine any form made of malleable cast iron, it would have been unfair to prepare the test bars by filing or dressing, as such treatment would have removed the strongest portion, the skin; and a tool, no matter how sharp, tends to drag the metal and so leave small scratches or furrows, which offer beginning places for breaking. An undressed cast form is necessarily irregular, and this irregularity, increased by the draft of the pattern, made the measurement of the original area and of the fractured area rather unsatisfactory work, and, that the error might be partially eliminated, several bars were broken of each kind and the results averaged. With the idea that a cylinder can be cast more perfectly than a rectangle and that in a cylinder the shrinkage is not so damaging as in a rectangle, the form of the test bar was changed, and beginning with specimen No. 361, a bar 2 in. between shoulders and $\frac{1}{2}$ in. in diameter was used. In the first set of bars the unannealed sample was obtained from the part marked A in the sketch, and was taken from the same bar, which was afterward drilled in the flat part for the annealed sample. For the cylindrical specimens, one of the annealed bars was broken and the sample taken from the portion $\frac{1}{2}$ in. in diameter, and the annealed specimen was taken from near the fracture of one of the tested bars. In every case more weight should be given to elongation than to re-



duction of area, because of difficulties in determining the exact areas for computing the latter. With the exception of one case, specially tabulated in Table No. 2, and the heats tabulated in Table No. 5, the bars composing the sets were cast from the same ladle of iron, drawn about the middle ladle of the heat. All test bars received the same treatment in the annealing oven as far as position in the annealing pots and location in the oven were concerned.

The results obtained are not sufficiently numerous and uniform to warrant any general conclusions regarding the effect of manganese and phosphorus further than to say that phosphorus seems to be a very passive element and anything but the bugbear which it is to steel. A limited period of anneal, judging from the results in table No. 5, might be considered as giving better results than an indefinitely longer one, both as regards strength and malleability. There being no sure way of telling whether bars were thoroughly annealed and yet not weakened by over anneal, makes the physical results given a little uncertain as representing an iron corresponding to the analyses accompanying the results, and only by averages of many tests can the truth be known.

The chemical composition of specimens in Table No. 5 are not given, as at the time those bars were cast, the importance of pouring all the bars in one set from one ladle, in order to have them of the same composition, was not

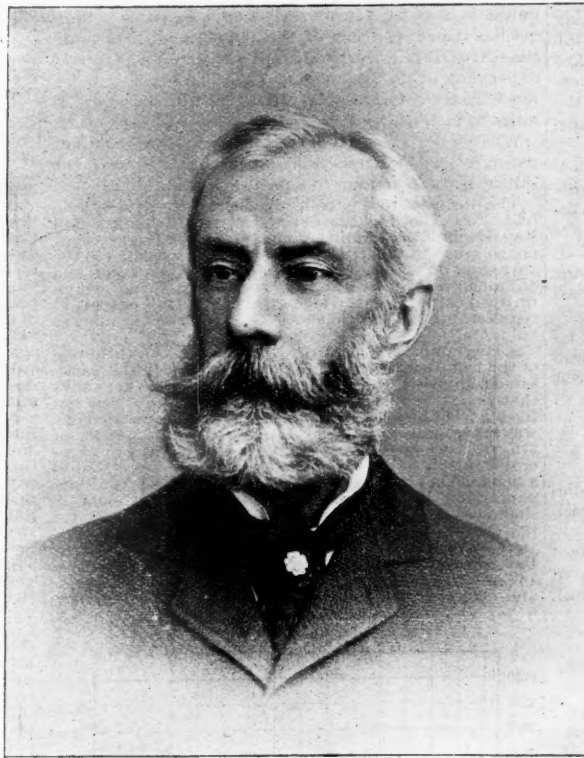
appreciated. As there were so many bars in those sets, several ladles of iron were required to pour them, and being drawn by one man they differed widely, and, therefore, the analyses are not reliable. Carbon, however, seems to be little affected, either in total percentage or combined carbon, and the other impurities are not affected at all.

The difference in the average percentage of loss of carbon in Tables Nos. 2 and 3 may reasonably be attributed to the difference in the form of the test bars in the two tables. In Table No. 2 the bars were rectangular and the average loss of carbon is over 50 per cent. more than for the cylindrical bars in Table No. 3. To get the drillings a $\frac{1}{8}$ -in. drill was used and was entered into the bar in both cases till it became fouled in the skin on the other side of the bar. Allowing the skin to be $\frac{1}{16}$ -in. thick, in the rectangular bar, $\frac{1}{8}$ -in. of center was added to the drilled sample and $\frac{1}{16}$ -in. of skin, while in the cylindrical bars $\frac{1}{4}$ -in. of center was taken and $\frac{1}{16}$ -in. of skin. From the second form in Table No. 4 the skin is seen to be much lower in total carbon than the interior and higher in combined carbon, and making allowance for the difference the real loss of carbon for the two tables is found to be nearly the same.

The author acknowledges obligation to the New Jersey Steel and Iron Company, of Trenton, N. J., and to Prof. J. B. Johnson, of Washington University, St. Louis, Mo., for the use of testing machines for making the physical tests recorded in the accompanying tables.

Mr. E. F. C. Davis.

We briefly recorded last week the tragic death of Mr. E. F. C. Davis, President of the American Society of Mechanical Engineers and General Manager of the C. W. Hunt Company. Mr. Davis was born at Chestertown, Md., in 1847. He was educated at Washington College,



The Late E. F. C. Davis.

President American Society of Mechanical Engineers.

Maryland, having been graduated in 1866. His parents intended him for the profession of law, but he had a strong natural preference for mechanical matters, and was so resolute in his determination to become an engineer that he finally secured the consent of his parents to his making an effort in that direction. He went to Philadelphia and entered the employ of Brinton & Henderson, hydraulic engineers, as an apprentice, where he learned the arts of machinist and draughtsman. At the end of his apprenticeship he was employed by Messrs. Hoy, Kennedy & Co., of Newcastle, Del., later of Brooklyn, N. Y. After several years with this firm he went as draughtsman with the Pottsville Iron & Steel Co., and later became draughtsman and assistant to Mr. S. D. Whiting, Superintendent of the Colliery Iron Works at Pottsville, Pa.

In 1878 Mr. Davis entered the service of the Philadelphia & Reading Coal & Iron Co. as mechanical draughtsman. A year later, that is, at the age of 32, he was made Superintendent of the company's shops at Pottsville. These shops were then being established for building and repairing mining machinery. The work of organizing this establishment fell principally upon Mr. Davis. In 1887 he became Mechanical Engineer for the company, which position he resigned in 1890 to become General Manager of the Richmond Locomotive and Machine Works. This position he gave up last spring to take the position which he held at the time of his death.

Mr. Davis was a man who had won the personal regard of a great many of the best mechanical engineers of the country and who had before him the promise of a very useful and influential future.

The Tests of Fire-Proofing Materials.

Arrangements have finally been made for making fire tests of structural material and fire-proofing materials, on the lines more or less talked about for some months and in accordance with suggestions and plans originally made, we believe, by Mr. H. de B. Parsons. The American Society of Mechanical Engineers declined to take the matter up and pay the expense as a society, for reasons which seem to be sufficient. Arrangements have been made, however, for securing money enough to warrant beginning, the insurance companies and various individuals having made considerable subscriptions, the Carnegie Steel Company having agreed to give all the iron and steel required and the Continental Iron Works having arranged to give the ground necessary for the erection of the furnaces.

A committee has been selected by the fire insurance companies, the architects and the engineers. This committee is composed of Mr. S. A. Reed, representing the Tariff Association of New York; Mr. G. L. Heins, of Heins & La Farge, representing the Architectural League, of New York, and Mr. H. de B. Parsons and Mr. Thos. F. Rowland, Jr., of the American Society of Mechanical Engineers. The committee acts entirely without compensation. Subscriptions will not be accepted from manufacturers of fire-proofing material but it is expected that such manufacturers will be glad to send samples of their materials for testing and they will be asked to pay the cost of erecting and removing their ma-

terials. The committee will be glad to get subscriptions from engineers, architects, builders and others who are interested in the work.

The building of the plant has already begun. A gas producer will be erected to supply fuel gas, which will be arranged to receive a spray of petroleum in case higher temperatures are wanted than can be got from burning the gas alone. Furnaces will be built for testing full-size columns and in these furnaces floors will be erected of the materials furnished. The furnaces will have a foundation substantial enough to provide for the hydraulic cylinder for bringing pressure on the columns tested and will carry the gas pipes. On these foundations a room will be built of the materials to be tested and in this room will be placed the column undergoing test, insulated by means of the fire-proofing which is to be tested. Outside the walls of the test chamber will be piled various materials, more or less combustible. Then the heat will be applied, and at the same time the column will be loaded by hydraulic pressure and the floor arches will be loaded by dead weight. The temperature measured as accurately as possible (and it is hoped very accurate measurements can be made), and the results on the loaded column, on the material of

floors and walls and on the combustible material placed outside the walls will be observed.

There is no question that a series of experiments made by such a committee, with sufficient means at their command, will be of the greatest value to engineers, architects and builders, and of no less value to the insurance companies. They will give a body of precise information where now most design is guessing and multiplying by 2 or 3, or 5 or 6. It will be a pity if the committee is hampered for want of funds, and any one who wants to help in carrying on this very useful work can do so by sending a check to any member of the committee whom he knows, or to the officers of either one of the associations mentioned, or to Mr. H. de B. Parsons, Room 106, 22 William street, New York City.

Railroad Track Melted by a Stray Electric Current.

On Sunday, July 28, a rail in the track of the Walpole & Wrentham line of the New York, New Haven & Hartford, at North Attleboro, Mass., was melted by an electric current, so badly as to materially impair its strength, and if the accident had not been seasonably discovered a derailment might have ensued. The place where the damage occurred was on the iron bridge over Mount Hope street and the current strayed from the trolley wire of a street railroad running beneath the bridge, in consequence of the breaking of an insulator.

In the accompanying illustrations, Fig. 1 shows the appearance of a piece of the rail after it was taken out and Fig. 2 shows the bridge. This structure is so low that the trolley wire could not be carried under it. The

wire therefore was run up to the bridge on each side, and there anchored to the girders, and the cars are run under the bridge by their own momentum. When an electric car reaches the bridge, the conductor releases the trolley pole from the wire and holds the pole down until he reaches the opposite side of the bridge, when he again allows the pole to engage the wire. The triangular piece of metal, shown in sketch at *D*, has its side edges bent down, forming flanges which serve as guides and enable the conductor to readily catch the wire. This piece is attached to the iron girder by three wires, each wire having a glass insulator about midway. One of these insulators, *C*, became broken, probably by the trolley pole striking it as it was raised after passing under the bridge, and allowed the electric current to escape to the bridge girder, charging the bridge. The current reached the track at

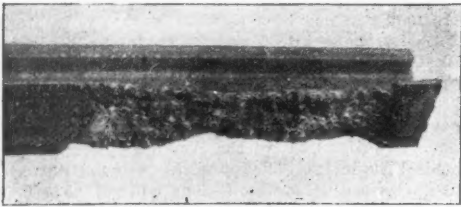


Fig. 1.—Rail Accidentally Melted by Electric Current.

the point marked *A*, having traversed the main girder, which is 4 ft. deep, to the transverse truss *B*. Rain had fallen on Saturday night, and there probably was a little dirt, mixed with cinders, between the rails and the transverse bridge truss, the top of which is about three-quarters of an inch below the base of the rail. This probably caused an arc between the truss beam and the base of the rail. The escape was discovered a few minutes before the arrival of the morning passenger train, so that the engineman had ample notice of the danger, although the reporters say that he was startled by seeing a blue flame. The molten metal fell to the street below.

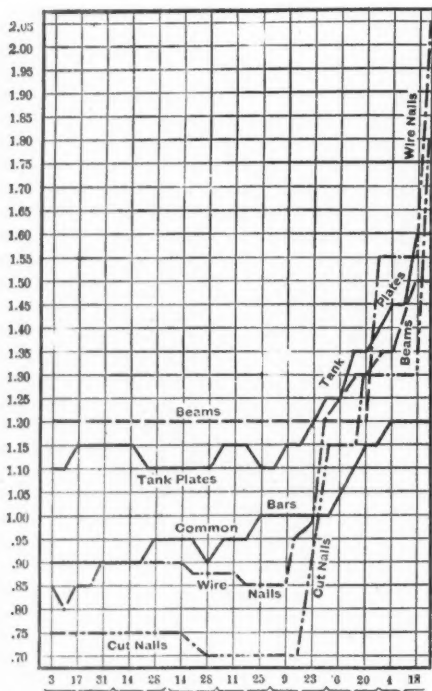
If the accident had occurred in the night time, when it would not have been so readily discovered, it is probable that the track would have been broken, and a derailment at a particularly dangerous place would have been possible. Again, if it had occurred on a week day, when trackmen and other employees are around the track, the men would doubtless have been endangered by the stray current.

Superintendent McAlpine, from whom we have received these particulars, found that the rail had been melted to such an extent that at one point the base was only 2½ in. wide.

Recent Advances in Iron and Steel Prices.

The *Iron Age*, on Aug. 8, printed two interesting diagrams of the recent rise in the prices of iron and steel, which we reproduce.

The upward rush began in May and has characterized both crude and finished material, although Southern iron has not yet risen in proportion to Bessemer steel.



Fluctuations in Prices of Beams, Plates, Bars, Wire Nails and Cut Nails at Mill, in Cents per Pound.

Billets have also lagged behind the Bessemer pig. Large associations have controlled the rise in nails, while that in tank plates and beams was due to the rapid expansion of the demand and advanced cost of manufacture. The diagram for finished material is based upon Pittsburgh prices for beams, tank plate and common iron bars and upon mill quotations for cut and wire nails.

Trolley Competition in Connecticut.

In the August number of the *Engineering Magazine* appears an excellent article by Mr. Clarence Deming entitled "The Trolley in Competition with the Railroads." As Mr. Deming lives in New Haven and has for years watched carefully the railroads of Connecticut, and is in pretty close touch with the "Consolidated" people, his article is particularly valuable with regard to the conditions in Connecticut, to which state he con-

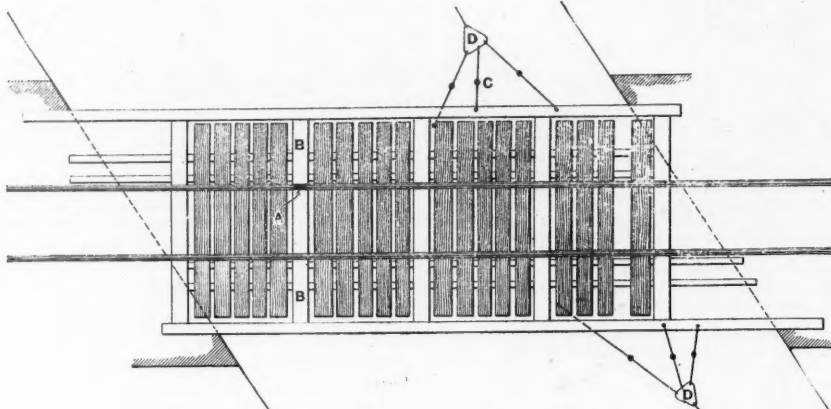


Fig. 2.—Bridge at North Attleboro, Mass.

fines himself. Connecticut offers a more attractive field for electric railroads than any other state in the Union, unless it may be New Jersey. Eighteen cities contain not less than 65 per cent. of the population; three counties—New Haven, Hartford and Fairfield—include about 68 per cent. of the total population. The maximum distance from any Connecticut city to the nearest city is 23 miles by rail, while various cities merge into each other.

What follows is quoted literally from Mr. Deming's paper, but we have undertaken to give only some of the salient features and not to reprint it in full:

The obstacles to the trolley in the state have been two-fold: First, that tenacity of property rights so mark d in New England communities, and revealed in Connecticut, not so much in the cities, as in the opposition to the surrender of the highways outside of them; second, and of much greater moment, the resistance of the steam-railroad corporations, which own or control properties representing not less than \$200,000,000 at present market values.

A large number of new projects awaited the authority of the legislature of 1891—so many that, when the partisan deadlock which made the session a blank began in that year, it was predicted freely that the electrical interests would force a settlement. But no settlement was made, and the effect of the legislative hiatus of two years was to mass new enterprises for the next general assembly—that of 1893—on which they descended in a flood. They were resisted stoutly by the steam companies, but, by alliance with the "granger" element in the lower House, won a victory—on a question of the powers of the Railroad Commission over new trolley projects—which forced, as a compromise, the general electric law now on the statute-books of the state. Its most salient provisions are: (1) local control—by mayors and common councils in cities, wardens and bur-

in; and in consequence there are now few trustworthy official statistics of Connecticut street railroads and no official compilations. The legislature of 1889 passed a bill which prohibited grade-crossings of steam railroads by horse, cable and electric roads. But in the next working legislature of 1893—the deadlock having intervened—the electric companies secured a modification of the law, so as to legalize those crossings, if approved by the Railroad Commission. That body, which, from the first, had opposed the crossings, while allowing them in some cases, took a rather resistive attitude. Then a long and sharp legal contest ensued over the question of the right of electric companies which by charter had been granted the special privilege to cross at grade to override the general law. In the test case—that of the Bridgeport Traction Company against the Consolidated Company, involving a very dangerous grade crossing at Bridgeport—the latter corporation won in the lower court, but, by a divided bench of three judges to two, was defeated on appeal, one of the points raised being the priority in time of operation of the charters as against the general statute. Meanwhile great popular opposition had arisen against grade-crossings of steam and electric roads, and at the end there was a kind of race between the legislature and the Traction Company, which needed the court's final order before laying its rails. The legislature won; a terse bill absolutely prohibiting grade crossings was literally "railroaded" through the general assembly, and is the law to-day. Though popular and justified, the new statute favors plainly the steam companies with their established lines, and it is predicted that in certain cases, by laying short spur tracks from their lines, they may be able to pervert to their own advantage against trolley parallels the benefits derived from the new prohibitory statute.

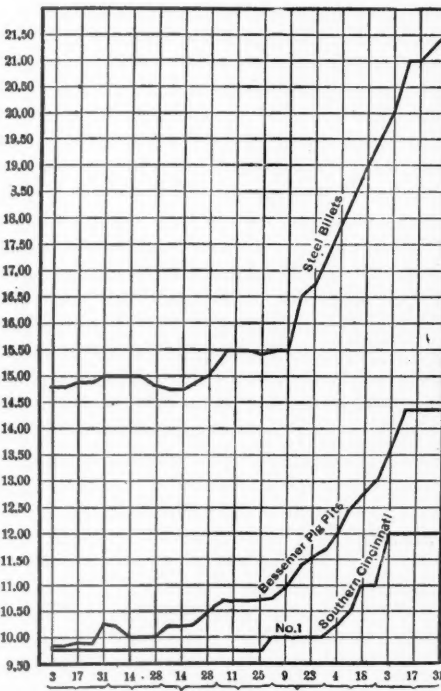
While, owing chiefly to the legislative deadlock, the period of active electrical expansion has spanned but a little more than 29 months, the statistics of growth are impressive. In January of 1893 there was in single-track a total of 147 miles (approximately) of street railroad in the state, of which about 81 miles were operated by horse power and 66 miles by electricity. There are now about 289.0 miles, of which all but two short roads with some 5 miles of track are electrically equipped.

Actual investment in street-railway properties of the state it is impossible to compute. The latest statements of the corporations show roughly an issued capital stock of \$8,566,000, and bonded debt of about \$6,662,000. But, owing to stock inflation, the actual investment is far below the total (\$15,228,000) of the two. The old roads, when electrically equipped, have shown the wonted increase of business. For example, one important line, on an increase of mileage of 57 per cent. returns for 1894 (electric) over 1893 (horse) a gain of 72 per cent. in gross earnings; another line, of about 12.5 miles, shows, with an increased mileage of 14 per cent., a gain of 81 per cent. in 1895 (electric) over 1894 (horse); while a small road shows for the same years a gain of more than 100 per cent. for electricity, with an increased mileage of but 29 per cent.

The figures for total mileage in the state show about 97 per cent. increase in single-track miles within the period of 29 months. In January of 1893 there were 22 distinct street railroad corporations operating their lines. There are now not more than 24, although single-track mileage has increased 97 per cent., showing the swift process of both extension and absorption which has followed the introduction of the trolley. The increase in not a few cases has been too speculative. New roads too often have been built, crudely and crudely equipped, "financed" on bonds under "special" charters, while the stock has been held with partial or even no payments at all, and to a degree the first impacts of the trolley, under the auspices of foreign capital, have duplicated the kiting epoch of steam railroad building brought to so disastrous a climax in 1873. To these reasons for financial and popular criticism have been added the hawking of charters and a tendency to "grab" streets, to invade municipal politics, and to tamper with city councils.

Of "projected" trolley roads—using the quoted word in its most ample sense, from actual layout to speculative hope—there are about forty-one enterprises in the state reaching over some 381 miles of single track, some of them extensions. A good many of them have been smitten hard in the present legislature, but a system which contemplates a new mileage about 32 per cent. larger than that of all the street railroads already built in the state can be pruned much and still be portentous. In view of its size and ambitions, perhaps the organized resistance of the steam companies in the lobby and their sway over the legislature, while revolting to the ideals of representative citizenship, have not been unmixed evils.

The effect of trolley roads in the state as parallels of the steam lines is a subject upon which clearer light is



Fluctuations in Bessemer Pig at Pittsburgh, No. 1 Southern Foundry at Cincinnati, and 3 x 4 inch Billets, Pittsburgh.

guesses in boroughs, and selectmen in towns—of layout, track, speed and equipment of electric roads; (2) compulsory maintenance by the company of the street between tracks and of 2 ft. on each side; (3) right to carry both passengers and freight on approval of the Superior Court; (4) parallels of steam roads to be amenable to the same jurisdiction—with power of appeal on questions of law to the Supreme Court; (5) towns, cities and boroughs, as well as the companies, to be liable in

thrown than on some other phases of the steam-trolley problem. Counsel of the Consolidated road has presented at a committee hearing in Hartford the annexed figures of loss in number of passengers for the two periods of six months each, ended with February of 1894 and February of 1895, to show the effect of parallel competition up to that time.

Between Bridgeport and Fairfield (5.1 miles), for De-

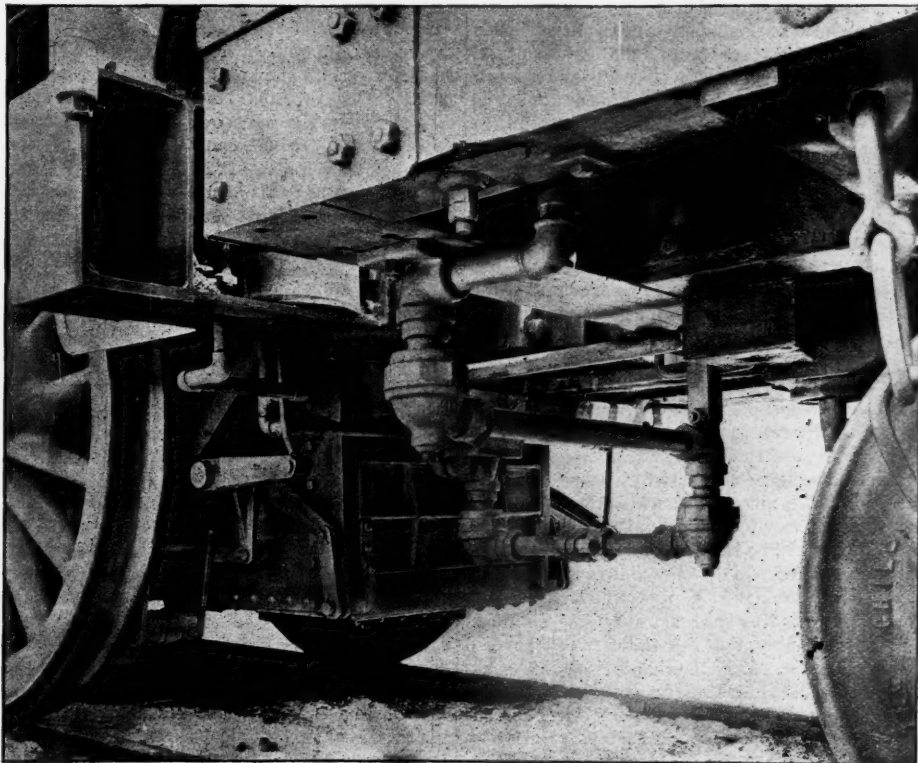


Fig. 1.—Moran Flexible Steam Joint between Engine and Tender on the Pennsylvania.

cember, January and February of the two years, the following figures were also supplied:

	1894.	1895.	Decrease.	Per cent.
December.....	5,224	3,598	1,626	.3113
January.....	4,601	977	3,624	.7877
February.....	3,940	903	3,037	.7709
Total.....	13,765	5,478	8,287	.6005

Between Danbury and Bethel (3 miles) the following were the returns for two months:

	1894.	1895.	Decrease.	Per cent.
January.....	1,698	2,906	1,792	.3814
February.....	7,251	1,401	5,850	.8067
Total.....	11,949	4,307	7,642	.6100

The whole number of passengers for the stated periods of 1894 in the foregoing tables was 268,714 on about 55 miles (allowing for duplications) of the Consolidated road, and the decrease due to about the same total distance of trolley parallels was 146,301, or a little more than 54 per cent. Carrying out the ratios so as to obtain a full year's computation, the loss of the Consolidated Company would be represented by 339,744 passengers. The figures look large, but are not so impressive when reduced to dollars in the table following, where the

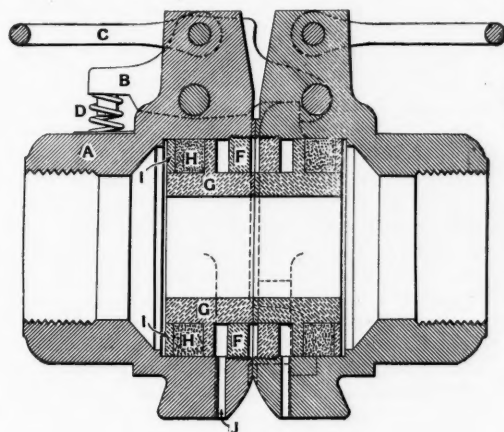


Fig. 4.

liberal estimate is made of 2½ cents loss per passenger per mile:

	Loss for the year.
Bridgeport and Stratford.....	\$2,373
New Haven " West Haven.....	171
New Haven " East Haven.....	922
Meriden " Yalesville.....	1,453
Hartford " Rocky Hill.....	401
Union City " Waterbury.....	3,603
Naugatuck " Waterbury.....	9,589
New Haven " Woodmont.....	1,327
Bridgeport " Southport.....	1,523
Meriden " Wallingford.....	2,816
So. Norwalk " Rowayton.....	1,114
So. Norwalk " Winthrop.....	101
Derby " Ansonia.....	23
Birmingham " Ansonia.....	148
Bridgeport " Fairfield.....	3,303
Danbury " Bethel.....	3,094
Total.....	\$32,431

(Continued on page 548.)

Renewing Old Steel Rails.

In the *Railroad Gazette* of Aug. 2 appeared a description of the plant of the Pioneer Rail Renewing Company, of Chicago. We have received further information about the work of the company.

The first lot of rails re-rolled was 200 tons of rather

badly worn rails from the Chicago, Milwaukee & St. Paul. The heights, weights, etc., of these rails were as follows:

Height.	Original weight.	Weight before rolling.	Weight after rolling.
In.	Lbs. per yard.	Lbs. per yard.	Lbs. per yard.
4	60	57	53
4½	60	58	54
4¾	56	54	52

Of the 60-lb., 4-in. rails there were 5,742 lineal feet, among which were two rails, which were scrapped, as nothing could be done to them. There were delivered back to the railroad company 5,916 ft. of rail, all of which were perfect except five, which were too badly flange worn to fill out. The result of the inspection was:

Finished rails.....	93,151	Per cent.
Two scrap rails.....	915	"
Scrap.....	5,117	"
Waste by oxidation.....	817	"
Total.....	100,000	"

It will be seen that while only 93.151 per cent. by weight of perfect rails was returned to the railroad company yet the percentage by length returned was 103.13, and the average loss of weight per yard was only 3.33 lbs. or 5.3 per cent. These rails will be relaid on one of the branch lines.

Since then 500 tons more of rails have been re-rolled for the same company. These were 4½ in. high, weighing originally 67 lbs. per yard. The weight before rolling was 66 lbs., and afterwards, 60 lbs. These rails when re-rolled conformed very nearly to the standard 60-lb. sec-

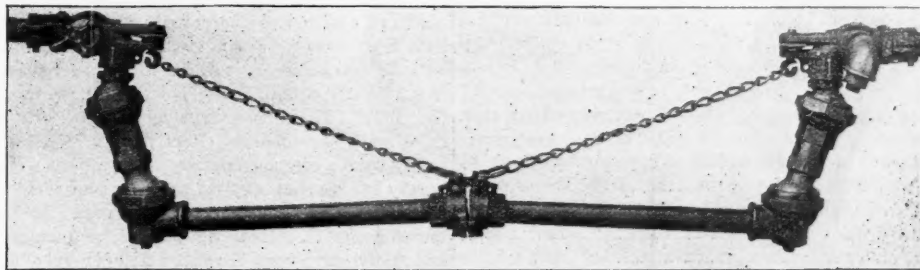


Fig. 3.—Moran Joint for General Steam Connection between Cars.

The Moran Flexible Steam Joint.

We spoke lately of the pretty general failure of metallic connections for air and steam transmission between cars and we now show the Moran joint which is one of the very few successful connections of this character.

Fig. 1 shows this joint and connections on engine 522 of the Pennsylvania Railroad Company. It was put in service in December 1893 and removed May 1895 for exhibition at the Master Car Builders' and Master Mechanics' conventions at Alexandria Bay. In this 17 months, the

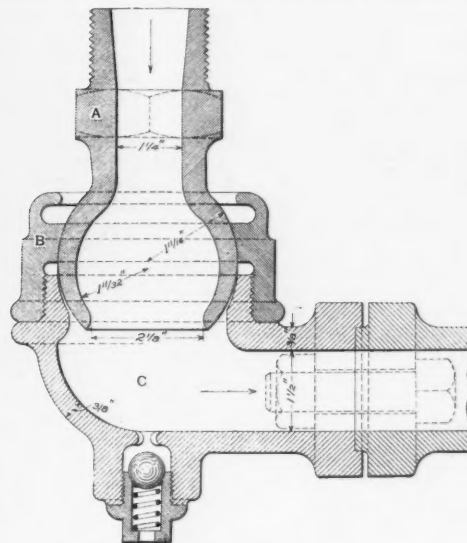


Fig. 2.—Sectional View of Joint.

engine made 63,911 miles on trains using steam heat at from 50 to 80 lbs. pressure, and 67,722 miles on trains not using steam heat. It is said that during this time there was no expense for repairs and the joint when removed was in as good a condition as when first put on. In this case the design of the joint was special for the Pennsylvania company, and the coupling consisted of two flanges bolted together.

A section view of the joint is shown in Fig. 2. It consists essentially of three parts, the ball A, the ring B, and the bell C, which in this case is made right-angled instead of straight. The ball is turned and ground to fit the interior wearing surface of the ring which is similarly prepared. The steam pressure keeps these two in contact. At the bottom of the joint is an automatic relief trap to allow the escape of condensed steam. With the steam turned on, the ball in the trap is kept in its seat, but a relief of the steam pressure allows the spring to unseat the ball, thus permitting the escape of the condensed water. When the steam is first admitted, all the condensation in the pipe is blown out before the pressure of the steam overcomes the resistance of the spring.

The design for general steam connections between cars made by the Moran Company is shown in Fig. 3. In this case two straight and two right-angled joints are employed. The pipe coupling is also shown, the figure showing the position at the moment of release. Tension on the chains, caused by the train breaking in two, will raise the latch and undo this coupling, which is applicable for either pipe or hose connections. A section of it is shown in Fig. 4. The two halves are identical. Each half consist of a malleable iron case A, latch B, link C, spring D, stop ring F, piston G, gasket H, and back ring I. This brass back ring is first inserted into the

case and the composition gasket is put on it. The piston G, which fits loosely is kept from falling out by the stop ring F. The lightness of the joint does not depend on the cases at all, but on this piston. The pressure on the rear of the pistons in each half of the coupling keeps the outer faces tightly together and forms a very efficient joint. From their shape these pistons can be reversed should the outer face become worn so as to leak. By this arrangement a slight wear of the latch on the couplings will not produce a leaky joint. A small drain hole J allows the condensation to escape, but will not permit a loss of steam.

These joints are also used for steam and air piping in quarries, etc., where flexibility of the connections is necessary. They are made in large sizes for loading oil vessels and in hydraulic dredging



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At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

So much misinformation has been published as to the purpose of the Baldwin-Westinghouse people that it may be worth while to say a little more explicitly what we have already said as to precisely what they intend to do. The first work to be done is to get up a set of designs for standard equipment. This will include motor trucks for light and for heavy service. Whether these trucks will be put under cars which will carry passengers, or baggage or freight, or mere ballast to give adhesion weight, will depend entirely upon the conditions in which they are used. This is a mere detail of construction. It is quite likely that in some cases the platforms under which such trucks are put will be covered over, to give the vehicle something of the appearance of electric locomotives, such as have already been built. It is quite possible, also, that this will not be done. The essential thing is to get up designs for trucks to carry the motors, which will be up to the best locomotive practice in economy of construction, safety of operation, and ease and economy of repair. When this equipment has been designed doubtless one, or two, or three motor trucks will be built, and will be used experimentally. The companies have many requests for plans and estimates for electrical equipment of existing lines and of projected lines, and it is highly likely that they will have all they can do as soon as their standard equipment is thoroughly worked out. We have not learned, however, that they have been asked for designs for equipment for main lines of railroad, and feel sure that they would not encourage such an experiment.

The railroad superintendent who believes that his conductors have the moral courage to collect fare from a brother conductor (from another road) or one out of a job, is "the biggest fooled man on earth," according to the statement of a superintendent at a recent meeting of railroad officers. This statement was made in the discussion of a paper by Mr. C. A. Wilson, General Superintendent of the Wheeling & Lake Erie, telling how he has devised a plan for permitting his conductors to exercise individual discretion, under restriction, when a railroad man asks to be passed. Mr. Wilson seems to be well satisfied with his plan, and his description of it is copied in another column of this issue. The rationale of this plan is based entirely upon the clause in the introduction to the standard code, which says that a rule which cannot be enforced ought not to exist. Mr. Wilson assumes that this has come to be an accepted axiom, or ought to be such; and he is right. No superintendent at the meeting had heard of such liberality as Mr. Wilson describes, except one or two from minor or exceptional roads, and they all fought shy of the request for their opinion of the practice. But the universal present practice of conductors is firmly founded on traits of "human nature" that can be changed only by great effort and expense, and the query, usually held to be unanswerable—What are you going to do about it?—compels every one to admit that this novel plan is reasonable, unless he can offer some-

thing better. To constantly follow up these wandering deadheads, to see that your own men are not too free, is, indeed, a bit of a task, but who knows but what the correspondence incident to this surveillance would be just the vehicle necessary to enable the superintendent to keep in that closer touch with his subordinates which every one admits to be desirable? The personal equation is specially prominent in this matter on both sides. The coldness or the benevolence of your own conductor or agent, the suavity or the poverty of the applicant for the free ride, and a dozen other elements, enter into each question and must be reckoned with. It would be impossible to enforce anything more businesslike than Mr. Wilson's plan without introducing an elaborate scheme of supervision which would be very costly. Indeed, it will not be boys' play to keep 20 or 100 conductors up to the very moderate degree of business regularity demanded by this plan. There will be temptations enough to pass friends and "make no account" of the transaction; and the stiffening of conductors' backbones, so that they will resist such temptation, is a matter that needs constant attention. Since Mr. Wilson's paper was read it has been mentioned in the newspapers that the Vandalia Line has authorized conductors to pass members of the brotherhoods on evidence of their membership in good standing. This will be hailed as the "softest snap" on record. As the Vandalia is not a road which has to manufacture men of straw to hold down the seats in its passenger trains, it will be interesting to see how the new rule is administered. On the surface it is a discrimination against reputable railroad men who do not belong to brotherhoods; and, as was remarked in the discussion on Mr. Wilson's paper, that is a thing which no road can afford to allow. It is true that all free rides are favors, and the discrimination here referred to cannot, perhaps, be dignified by the name of injustice; but unless the brotherhoods have greatly improved lately, this move is a recognition of them which will need to be managed with a great deal of tact.

A correspondent, "Middleburgh," who evidently lives near a freight yard, writes to ask why, in the present stage of civilization, he is obliged to submit to outrageous noises, day and night, from switching engines. He says that the engines in whose neighborhood he is compelled to live seem to have full loads about nine-tenths of the time, have to push all their cars up hill, and are kept so hot that whenever the puffing, which almost stops conversation in the surrounding houses, is suspended for a few moments, its place is instantly taken by the safety valve, which stops the conversations completely; and he thinks we ought to "give 'em blazes," by which he means, we suppose, something hotter than the ordinary blazes that we are familiar with on the surface of the globe. This question can be separated into several parts, and we are not sure that we know enough particulars to correctly answer all of them; but in general it is safe to say that the fault lies with the superintendent and "Middleburgh"—the former is careless and the latter does not fight. It is true that he ought not to be obliged to fight, but as we cannot remove or improve his superintendent, it is the most effective course we can recommend, and, after all, humanity seems to have secured very little except by fighting. A superintendent who wishes to have a reasonably quiet yard generally must begin by disciplining his runners. They must learn not to run with full steam a single revolution more than is necessary. The next thing is to use mufflers on the exhaust—or, rather, to use exhaust nozzles with the openings divided sufficiently to soften the blast. These two expedients cover the whole case with reasonable effectiveness. Mufflers for safety valves are so generally known that we could hardly believe that any enterprising road would omit them on yard engines to be used in towns, but for the fact that we notice the omission occasionally ourselves. An unmuffled pop-valve is such an outrageous nuisance that our correspondent could not be blamed if he delegated his fighting on that point to the district attorney or the police. An up-hill yard—one where trains are broken up by pushing cars up hill instead of dropping them down—also is a thing which we should like to say was entirely out of date; but as we know of such yards ourselves, made within the last few years, by otherwise well-managed roads, we must admit that our correspondent's complaint is not necessarily based on imaginary evils. Any superintendent who prefers to switch cars up hill ought to be compelled to put in a cable, a winding drum and a stationary engine. But the noise from the exhaust is a nuisance that exists in many yards otherwise well managed. If "Middleburgh" takes this note to the superintendent, and tells him that proper discipline will make the runners abate at least half the noise, we have no doubt that the point will be acknowledged. For the

remedy for the other half of the nuisance the superintendent should take a lesson from some road that has suitable exhaust mufflers—say the Manhattan Elevated of New York City. There is no unnecessary noise where the sufferers persistently demand its abatement.

Electricity and Credulity.

In our studies of natural history, as we follow the great class of mammalia down to the genus homo, we come to a species known as gobemouches, or fly swallowers. This species is characterized by a credulity which suggests the genus ovis and a great but inconstant curiosity, which indicates a close relationship with the quadrumana. It is distinguished from the rest of the genus by its mental qualities alone, being, so far as scientists have yet been able to ascertain, identical physically. Therefore, it is impossible for us to form the least idea of when it began to differentiate. We know, however, that it has existed about as long as recorded history and may fairly infer that it goes back much further. In the days of St. Paul "all the Athenians spent their time in nothing else but either to hear or to tell some new thing." Obviously, they were highly developed gobemouches. In our own time, the species is perhaps not as conspicuous as it was when St. Paul made his studies among the Athenians, but it is prosperous.

We question if any Athenian ever performed a more remarkable feat of fly swallowing than did the editor of one of the most important papers in one of the greatest of the Atlantic coast cities a few days ago. That editor gave up over two columns to a simple "fake," which he would have recognized as a fake by its conspicuous earmarks if he had not been far gone in gobemouchery. That story was that three great Chicago trunk lines have had specifications made for electrical locomotives, have asked for estimates, and "if these electrically propelled engines can be procured at a reasonable price, the rest of the plan will be very easily developed." The rest of this simple plan is to establish power plants at the Illinois coal mines, there to generate electricity, thus to save the cost of carrying coal to Chicago and other centers, and to use this power for locomotive purposes by means of storage batteries. Starting out from Chicago, for instance, a locomotive will be fitted with a storage battery, which will run at a certain speed for a certain distance. When this battery is exhausted the locomotive will stop, and "in a very few minutes' time, by the use of a crane working by electricity, the exhausted battery will be removed and another, fully charged, will be put in that one's place." And so the train will go on. The managers of these three great railroads have not gone far into the question of speed. It is sufficient for them to know, as they do, that it is possible to get and maintain, with safety, a higher speed with these storage battery engines than can be secured by steam. It is probable that this speed will be "more economical." The writer in the newspaper does not tell us more economical than what, but, presumably, than the normal speeds of to-day made by steam locomotives. This substitution of electricity will involve a great expenditure, but it is believed that it will be in the line of economy.

If the editor of that newspaper had chosen to step around the corner, or to send a boy around the corner, he could have learned that the storage battery is still so low in efficiency returned and so costly in maintenance that an ordinary railroad could not afford to use it for locomotive purposes if it were charged for nothing. We do not say that this will always be so. A man would be a fool to make such an assertion; but we do say that this is a fact patent to-day to so many responsible engineers, not only steam engineers but electrical engineers, that there is no excuse for an editor misleading his readers as did the editor who published the story to which we have referred.

Of course the recent understanding arrived at between the Baldwin Locomotive Works and the Westinghouse Electric Company has stimulated the publication of an immense amount of facts that are not so, and theory based on such facts. One of the metropolitan dailies, for instance, has said that "this combination seems to indicate that our existing railroads will enter upon the great work of substituting stationary for movable sources of power." This journal suggests that "the time will come when our magnificent locomotives will be contemplated as curious instances of misapplication of power and waste of fuel," and the writer says "already when we compare the noiseless flow of energy through a slender wire and the terrific waste of hurling through space a locomotive weighing 100 tons, we seem to feel that the old order must soon change." Another metropolitan daily, apropos of the same event, informs us that one of the Chicago railroads has actually made arrangements to equip its lines with electric locomotives.

It would have been very easy for the latter journal

to ascertain by the simple method of telegraphing, or perhaps the still simpler method of sending a boy with a note down to Wall street, that the railroad which it named, has as a matter of fact, made no such arrangements. It could have informed itself very easily also that that railroad has been talking of the introduction of electric motors for suburban business but that it is highly improbable that even this step will be taken; first because the railroad has no money to spare to make costly changes and second because it has no suburban business that would warrant such a change. All of these editors could easily have ascertained the opinion of the men most competent to speak on this subject and the reasons back of these opinions, and so could have given to their readers intelligent and useful information.

For instance, perhaps there is no living man who has a greater personal interest in promoting the rapid spread, far and wide, of the use of electricity than Mr. George Westinghouse, and there are not many men who have had the means that he has had of getting an accurate judgment of the condition of the electric art. But Mr. Westinghouse has repeatedly put himself on record, and especially so in interviews regarding this last combination, as believing that it is still impracticable to use electric locomotives for ordinary main line traffic. Indeed, he does not see any prospect that this can be profitably done for years to come, if ever.

Mr. Frank J. Sprague, past-President of the American Institute of Electrical Engineers and an authority of the first rank, has said within two months that "electricity will take the place of the steam locomotive only in part, and then only when the number of units operated between terminal points is so large that the economy will pay a reasonable interest on the cost." He says that the electric motor "will replace the locomotive on many suburban and branch lines; it will operate almost all street railroad systems and elevated and underground roads, but it has not sounded the death knell of the locomotive any more than the dynamo has sounded that of the stationary steam engine." He showed very thoroughly that, so far as anybody can now see, it will be impossible to work main lines by electric power.

Within two months Dr. Louis Duncan, President of the American Institute of Electrical Engineers, another high authority, has expressed substantially the same opinion as Mr. Sprague, but has gone a little further. He thinks that it would be impossible to change the present system of freight traffic: that it will not pay; that in passenger service for main lines of railroad, with single track or double track, unless the case is a very exceptional one, it will not pay to equip the main line electrically; that with a four-track road it would be possible to run express service at short intervals evenly spaced on two of the tracks and to keep the freight and local passenger trains on the other two without interference. In such cases it might pay to use electricity for heavy main line traffic, but even here, if a considerable number of foreign cars must be handled, as on the New York Central or the Pennsylvania, he says that the conditions would not be favorable and that the question of the equipment of the express tracks electrically would have to be carefully considered. We may add further that there is very little four-track railroad in the United States.

The gentleman who has been selected by the Baldwin-Westinghouse combination to act as their joint chief engineer, said, a year ago or thereabouts, "it is not at all probable that the immediate future will find electric locomotives taking the place of steam on main lines for regular work, as the expense of installation is out of proportion to the advantage to be gained by the change; but for elevated roads, suburban work and switching the change will be rapid." This is still his opinion.

These are examples of well known, easily available opinions by men of the first rank. Therefore it is not necessary for the editors of the daily papers to mislead their readers as to the situation if they really feel serious responsibility for what they say on this subject.

The excursion season seems now to be in full blast. Reduced rates have been made for Christian Endeavorers, Knights Templars, Total Abstinents, Liberal Drinkers, and all sorts of Orders and disorders that could be scared up, and yet the seats in the passenger cars are not filled, and numerous roads are inviting ordinary people to patronize plain, ordinary excursions. Niagara Falls seems to get more long distance excursions than any other place. This, in fact, has been the case for several years, a half-dozen large roads advertising the attractions of this resort throughout thousands of square miles of territory. Early in this month the Western New York & Pennsylvania and the Lake Shore & Michigan Southern ran large excursions to the Falls. On Aug. 6 the Big Four sent there seven trains carrying 3,500 passengers. Later the same road sent 24 carloads. On the

8th the Lake Erie & Western sent 97 cars, carrying 3,500 passengers. The Nickel Plate sent an excursion to the Falls on the 9th and will send another on the 21st. The Cincinnati, Hamilton & Dayton has had the reputation of sending larger excursions to the Falls than any other road, but we have seen mention of only one from that road this year, which was on the 15th. The roads eastward from Chicago have very generally refrained from running excursions to Niagara Falls from that city, for the reason that reduced rates for such a trip would give the scalpers a very good opportunity to sell cheap tickets for regular through travel; but the New York, Chicago & St. Louis this year advertised an excursion to the Falls from Michigan City, to which latter point it was arranged to carry passengers very conveniently by boat from Chicago, and the other lines at once concluded that something would have to be done. The Chicago & Grand Trunk promptly announced three excursions to the Falls for this week at a round trip rate of \$7. It is said that the General Passenger Agent expects to take 5,000 passengers. Chicago papers say that the Wabash ran a similar excursion from Chicago on August 14 at \$7 for the round trip. The Pennsylvania has run a large excursion from Pittsburgh to the New Jersey sea coast, as in former years. There were three or more trains of sleeping cars besides a number of day cars, and it is said that more than 1,500 passengers were carried. The citizens of Pittsburgh seem to fully appreciate the attractions of a railroad pleasure ride. A local paper recently mentioned a Presbyterian picnic excursion from there to Idlewild, for which 90 passenger cars were required. On August 8 the Pennsylvania took an excursion to Atlantic City, which picked up many passengers as far west as Columbus, Dayton and Cincinnati. There were over 700 passengers in the trains when they reached Philadelphia. The round trip fare from Cincinnati was \$15. The Baltimore & Ohio has run similar excursions from the west, making a rate of \$18 from Chicago to Atlantic City and return.

The city of Philadelphia is an inexhaustible excursion field of itself. We do not know that the Philadelphian loves the seashore any better than do the people of other cities, or visits it any oftener—New York and Brooklyn turned out from 100,000 to 200,000 excursionists last Sunday, probably half of them going to Coney Island—but he makes longer railroad journeys to get to the coast and his movements are, therefore, of more interest to railroad traffic men. Last Saturday and Sunday, according to the *Philadelphia Record*, all records for seashore travel were broken, fully 60,000 Philadelphians going to the ocean to escape the heat of the city. All the railroads leading to the seashore had their capacities taxed to the utmost and many other thousands went to inland resorts. Atlantic City, as usual, received the bulk of the exodus to the shore, fully 50,000 people going there, while the other 10,000 went to Cape May, Sea Isle City, Ocean City, and other Jersey resorts. The West Jersey and Camden & Atlantic (Pennsylvania) roads took down in the two days 512 cars. These included various special excursions; one from the Schuylkill Valley and from Harrisburg filling 35 cars; the Cape combination excursion, including the Sixth Ward Republican Club, the Order of Railway Conductors, Horseshoers' Association and others, taking 48 cars; Continental Mariners, 10 cars, and the Ancient Order of Hibernians, 25 cars. The Reading Railroad's Atlantic City line carried to Atlantic City in the two days 470 cars, including an excursion of 5,500 people and another, the Bayard Legion, of Wilmington, Del., of 1,000. The South Jersey Railroad took 47 cars to Cape May.

The cheapest excursion we have heard of this year was on the Cleveland, Canton & Southern. On Saturday of last week that road took about 1,500 passengers from Zanesville to Cleveland and return, and it is said that the rate was only 75 cents. The distance each way is 143 miles. It appears that the tile workers of Zanesville, who go to Cleveland every year, contracted with the Cleveland, Akron & Columbus this year to take them at 85 cents each, and about 2,500 people went over that road; but the other line got in with its 10-cent discount in season, it appears, to get three-eighths of the business. It is said that the entire population of Zanesville, except children and invalids, was to be seen in Cleveland on the day of the excursion. The Baltimore & Ohio fare from Chicago to Atlantic City, referred to above, is at the rate of 0.886 cent a mile, and the Chicago & Grand Trunk fare to Niagara Falls is at the rate of 0.674 cent, but the C., A. & C. rate, 287 miles for 85 cents, amounts to less than 3 mills a mile (0.293 cent), and the 75 cent rate figures out only 0.261 cent. And yet the people of Ohio, like their brethren in most other states west of the Alleghenies, profess to believe that they are woefully abused by the railroads.

The Empire State Express will have to look to its laurels. The East Coast and the West Coast lines from London are having another race to Scotland, like that of 1888, which resulted in permanent shortening of the schedules of their principal express trains. The tide of travel to Scotland does not set in until about Aug. 12, when the grouse season opens, but changes in the time-tables were begun early in July, and *Engineering* for July 26 reports a half dozen already made, each succeeding schedule being a little faster than the one before.

First one line and then the other would shorten its time, and the result is tabulated as follows:

(All of the trains leave London at night. In the table below W. means West Coast and E. East Coast.)

TIME TABLES, LONDON TO ABERDEEN, JULY, 1895.								
	W.	E.	W.	E.	W.	E.	W.	
London.....	8:00	8:00	8:00	8:00	8:00	8:00	8:00	8:00
Aberdeen.....	7:50	7:35	7:40	7:20	7:00	6:45	6:35	
London.....	10:00	10:00	10:00	10:00	10:00	10:00	10:00	
Aberdeen.....	2:00	12:00	11:00	10:40	9:45			

The distance from London to Aberdeen is 540 miles by the West coast and 523 miles by the East coast route. It will be seen that by the latest schedule, 10 hours 35 minutes, the train by the West coast line must make an average speed of 51.02 miles an hour. The trains by this line make six stops. The number of cars usually is six (8-wheel) and their total weight is 130 tons. The cars of the East coast trains weigh 175 tons, and those trains stop seven times. One train by the West coast (July 16) ran through in 10 hours 21 minutes, which is equal to 52.17 miles an hour. The trains of the East coast route run over the Forth and the Tay bridges, and for 40 miles over the Caledonian the road is single track. A later account shows even better time than that of July 16. On the 30th the West Coast train arrived in Aberdeen at 5:59 a. m., the trip thus having been made in one minute less than 10 hours, or at the rate of 54.09 miles an hour. The London & North Western uses the "President" type of engine, which was used in the race of 1888, and its northern connection (the Caledonian) also uses the same style of engine that hauled the trains over that road in 1888. The fast trips this year were made from London to Crewe by engine No. 394, and from Crewe to Carlisle by No. 790. *Engineering*, in a longer article, published Aug. 2, gives additional details, with a diagram showing the successive reductions of the Scotch schedules since 1870. On all of the runs made this year, the rate of speed is lower on the East Coast route than on the West Coast, and the inference to be drawn from the account is that this line has more difficulty in performing what it promises, although the distance is less than by the other line. Some of the East Coast trains weigh over 300 tons without the engine; and the North Eastern, which takes them over the first stage of the journey, sometimes puts on two engines; but generally the trains are hauled by one engine, a compound, which consumes only about 31 lbs. of coal per mile. This engine, weighing 115,000 lbs. and with 85-in. wheels, was described in *Engineering* of July 5. Referring to the attractions of the East Coast route, *Engineering* says that the number of passenger trains run over the Forth Bridge averaged 150 a day throughout the year 1894, and many of these trains were run over the bridge especially to carry sightseers.

The class system of the English railroads introduces some troubles for which we find no precise parallels in this country. One is stealing rides in carriages of a higher class than the fare paid calls for. This is inevitable at times of extraordinary crowds, and is not entirely unknown in normal conditions on lines like the underground. At the recent half yearly meeting of the London, Brighton & South Coast, a stockholder said that during the half year the company has carried 22,391,801 passengers and that of this number 3.7 per cent. were first class, 6.1 second class and 90.2 per cent. third class. The carriage equipment was one first class for every 256 passengers, one second class for every 5,366 passengers and one third class for every 18,920 passengers. It was apparent that the company had not sufficient rolling stock for the third class traffic, and the result was that the third class passengers invaded the first and second class carriages, without paying the increased fare. During the half year 20,000 third class passengers had been found traveling in a higher class and charged the excess fare, the amount of the excess being about \$5,000. The figures show that about one person in every thousand was caught traveling in a higher class than that for which he paid, but it was the opinion of this stockholder that at least 50 should have been charged excess fare. The Chairman said that all lines are subject to a great rush of third class passengers at special times, and the only remedy he knows of, is to discontinue the excursion travel, to raise the third class fares or to leave such passengers standing on the station platform when there was no room on the train. He questioned if either of these remedies would improve the position of the company before the public. Moreover, they would probably be legally liable if, having sold a ticket to a third class passenger for a certain train, they left him standing on the platform, so long as there was room for him in the train, even though it were in a carriage of a higher class.

The way in which the public interest often suffers by reason of the weak-kneed policy followed by municipal and other officers who like to evade responsibility as long as possible, is illustrated in the case of several grade crossings in Toledo, O. The State Railroad Commissioner, Mr. Kirkby, has been called to that city to act on a demand that he order gates or watchmen, or both, at railroad crossings on Chase street, Erie street and Lafayette street; but, according to an interview with him, which is printed in the *Toledo Blade*, he is not likely to comply with the demand. In one case, the street has not been finished, the travel upon it is very light and in muddy weather is reduced to nothing at all. Another case is that of a street crossing a track which is used only for switching, and not much of that. The Commissioner, in declining to act, says that the city

officials carelessly gave the public and street railroads rights, without restriction, and now expect the Commissioner to step and remedy their injudicious action. Mr. Kirkby says:

"Whenever the council grant franchises and privileges to the railroad companies they should look out for these points. That is the time to compel the railroads to protect the crossings. Now the city has granted the Terminal Railroad Company the right to cross streets in coming up to Cherry street and here there will be seven crossings at grade. They will expect me to protect the crossings, when by a little foresight all this might have been provided for at the time the franchise was granted."

It is still too soon to say why the metal frame work of a new and fine building, in course of construction in New York City, fell. It may be that too much load was concentrated at one place; or it may be that the foundation was on quicksand or partly over an old well. Or all of these conditions may have conspired. It is not too soon however to say that nothing of the kind could have happened without criminal carelessness. The exploration of the ground for foundations would have been a simple and cheap precaution and would have been taken by any good engineer in charge of the work. Furthermore, no competent engineer would have allowed the frame to be overloaded while it was under his control. The obvious moral is that important buildings should be controlled during all the steps of design and construction, by civil engineers. We regret that the recent fall in New York, of an important iron structure, while in the hands of engineers, took off some of the force of the moral.

The recent action of Mayor Jewett, of Buffalo, in vetoing the resolution of the Common Council awarding the contract for a new pumping engine to a Buffalo firm for \$74,500, as against a bid for \$68,417 presented by a firm outside the city, is worth special note. The Mayor sums up the matter in the following words: "When the city invites business men to offer bids in good faith for doing certain work, and requires them to demonstrate their good faith by depositing a certified check or bonds, the city gives a pledge that it will deal with them also in good faith. The city cannot honorably break that agreement." The veto was received and filed by the aldermen, who taking advantage of certain alleged departures by the Board of Public Works and the Common Council, from the charter requirements, decided to again advertise for bids.

NEW PUBLICATIONS.

The Bellefontaine Bridge. A report to Charles E. Perkins, President of the Chicago, Burlington & Quincy. By George S. Morison, Chief Engineer.

Mr. Morison's bridge reports are published in the uniform size of 14 in. x 22 in., giving a page large enough to properly display plates drawn to a satisfactory scale. The present report contains 40 pages of text and tables, 18 full-page lithograph plates and two beautiful reproductions from photographs. We have described this bridge at various times in considerable detail, and therefore shall not go far into the particulars now.

The first actual work on the bridge was done July 4, 1892. The first train crossed December 27, 1893. The principal engineers were Mr. George S. Morison, Chief Engineer; Mr. Alfred Noble, Assistant Chief Engineer; Mr. Ben. L. Crosby, Resident Engineer; Mr. E. Gerber, Office Engineer. The contractors were Messrs. Christie & Lowe for masonry; New Jersey Steel & Iron Co. for superstructure; Mr. Wm. Baird for erection, and Messrs. A. & P. Roberts & Co. for the viaduct.

This is a double-track railroad bridge and consists of four through spans, each 440 ft. long, and an iron viaduct 850 ft. long, of 28 spans, on brick piers, with pile foundations. The total length of the permanent structure from the back wall of the abutment on the south side of the river to the end of the iron viaduct is 2,630.77 ft. This south abutment is founded on rock above low water and there is virtually no south approach. The north approach consists of 2,960 ft. of temporary timber trestle built on the continuation of the grade of the iron viaduct. There are four masonry piers on pneumatic caissons. The greatest depth reached was 101.07 ft. below standard low water and the greatest immersion during work was 101.77 ft.

Pier 1 is an abutment costing \$25,452. The total cost of this and the four river piers was \$428,734. The total cost of the superstructure of the bridge proper was \$545,046. The viaduct, as we have said, consists of 28 spans supported on 27 bents, involving 52 small brick piers resting on piles and one special masonry pier. The total cost of these piers was \$32,426 and the cost of the viaduct was \$68,731. The total cost of the bridge, including freight charges, was \$1,322,719. This includes \$67,691 spent in protection work, mostly on the north side of the river. Here the erosion of the bank was peculiar, most of it taking place at low water. The existing shore line was protected by a mat from 150 to 200 ft. wide formed of woven willows covered with riprap. The restoration of the original shore line was accomplished by building a screen dike in the form of a pile bridge, the piles being driven through a mat 100 ft. wide sunk in the bottom of the river. A vertical mat similar to the shore mat was fastened to the outer side of the piles. This screen dike was built in 1892 and 1893 and during the winter of 1893 it was strengthened by putting 853 carloads of stone around the piles.

Fourth Report of the Bureau of Mines, Province of Ontario. For the year 1894.

This document of 260 octavo pages, contains much specific information as to the mineral industries of the Province of Ontario. It has a good table of contents and an ample index. Of course the most important single product is nickel, the Sudbury nickel mines being in this province. The nickel produced in the last three years has amounted to 6,300 tons, of a total value of \$1,658,000; the copper was 6,115 tons, valued at \$543,000. The mines give employment to between 500 and 700 work people. The whole product is exported to the United States and England, a little having gone to Germany in 1892 and 1893.

TRADE CATALOGUES.

An Ideal Engine Room. The Harrisburg Foundry and Machine Works, Harrisburg, Pa., 1895.

The little pamphlet bearing the above name contains a description of the engine room of the electric lighting plant of Keith's new theater in Boston. The room is unique in having green tiled walls, buhl tables holding potted plants, etc., and is of interest to engineers as an example of what can be done, by means of well designed systems of oil feeding, in eliminating the usual greasy and dirty features of engine rooms. The three Ideal engines generating current for 6,000 sixteen c. p. lights, are among the ornaments to the room.

Electric Snow Plows and Track Sprinklers.—Wendell & MacDuffie, 26 Cortlandt street, New York, sales agents for the Taunton (Mass.) Locomotive Mfg. Co., have issued a new catalogue illustrating and describing two styles of electric nose snow plows for country and suburban single track work, a double share plow for two-track city work and the Taunton track sprinkler.

Ore and Rock Crushing Machinery.—Mr. Earle C. Bacon, engineer and builder of hoisting, crushing and mining machinery, Havemeyer Building, New York, has just issued an illustrated catalogue of The Farrel & Bacon Ore and Rock Crushing Machinery, as built at the Farrel Foundry & Machine Co.'s Works, Ansonia, Conn., which can be had by those interested on application. He is also preparing for publication a catalogue of hoisting and mining machinery which will be issued next month.

Trolley Competition in Connecticut.

[CONTINUED FROM PAGE 541.]

The loss of \$32,461 is partly offset by the economies of steam service represented by the withdrawal of one train between Waterbury and Naugatuck, and probably much further by additional business fed the steam road by lateral trolleys; and even the parallels must also have contributed something to general business to partly offset their competition. But, taking the sum as it stands, it represents but about $\frac{1}{4}$ per cent. of the gross receipts (\$25,576,884) of the Consolidated Company's whole system in four states. At the same time it is to be remembered that the loss by immediate competition tends to increase, and that Connecticut losses of the Consolidated Company represent but a part of the total which has its larger fractions in Massachusetts and suburban New York. In closing this statistical branch of the subject, it may be noted that operated trolleys now paralleling steam roads in the state represent a total of about 91 miles. Their effect as rivals is naturally much less marked in cases where old roads have been equipped with electricity than in those where new roads have been built.

Since the opening of the present year the story of the campaign of steam against the trolley has been, both in the courts and the legislature, a well-nigh unbroken set of reverses for the electric companies. In the Superior Court, on the 10th of last April, Judge Hall made a most important ruling on the application of the New Britain Central Railroad and Electric Company to build a trolley line between that city (of about 32,000 inhabitants) and Hart-

ford by the railroad committee that electric companies intending to own their roadbed must come in under the general steam railroad statute passed 20 years ago, and expressly intended by the Consolidated Company to impede steam parallel schemes. Its provisions are very severe, compelling, for example, large subscriptions per mile and prepayments before construction can be begun; and all the costly obstructions to a steam enterprise were thus made, by the committee's ruling, to apply to an electric road. The decision is absolutely technical, turning upon the point that the general electric law refers in terms to "street" railways; hence, as an electric company owning its roadbed is not a street railroad, it falls under the general steam railroad law.

Intelligent public opinion in Connecticut, as distinguished from partisan opinion on the one hand and mere ignorance on the other, has passed through two stages, and is now in a third. At first it was distinctly hostile to the trolley during the period when electric transit was in its first ventures, when its equipment was bad, and when the noisy roads were deemed by many a crying nuisance. Later, as the system developed, public sentiment in both city and country became much more hospitable, and it was during this epoch that many streets and highways were rashly surrendered and valuable franchises granted without returns and with very inadequate restrictions or none. Since then there has been another reaction against the trolley, but along more rational and moderate lines. Popular judgment evidently favors now higher taxation of the trolley companies, the jealous preservation of the country highways both for present needs and future improvement, making the trolley companies pay for occupancy of city streets, and sharp checks on speculative financiering of trolley schemes. On the other hand, the plea of the steam companies, that as vested interests they are entitled *ipso facto* to a cover against new invention or new application of old motive force, finds scant favor, the recognized limitation here being that, where money seeks investment in a bona fide trolley enterprise, the test is a fair one of public necessity, whatever the steam companies may allege. As against the old vested funds, the rule holds clearly that electricity, paying fairly for its privileges, excluded from the public highways in rural districts and buying its own right of way, has a right to work out its own future, whether as a "parallel" or not. In that direction, at least, public opinion in Connecticut now strongly tends, and later is likely to crystallize, though perhaps not before steam and the trolley have fought many new and bitter conflicts.

Something New in Copper.

Announcement is made at frequent intervals of discoveries in the treatment of copper—usually in tempering it—and the discreet part of the world has long been pretty shy of such claims. A Chicago man has, however, succeeded in getting results which appear to warrant further attention. He is Mr. Albert E. Lytte, and he says that he has discovered a new process of treating copper, whereby castings are produced of a very superior quality and free from blow holes. During the past 18 months Gen. Green B. Raum has been interested with Mr. Lytte in the development of this process.

What is done to the copper we are not told, but the effect of the treatment is that the metal flows freely in casting and leaves very little trace in the crucible. The castings are solid, smooth and free from blow holes, and show a fine granular fracture when broken.

This treated metal can be produced of different degrees of hardness and is capable of being rolled into thin sheets or drawn into fine wire when cold, without annealing.

The Illinois Central Railroad shops have made some tests of this treated metal to determine its action while being worked in the machine shop. During the operations of planing, boring and turning it behaved much like steel, though slightly easier to cut.

During the past year the Worth Manufacturing Company, now of Benton Harbor, Mich., have been making the connecting rods of their gasoline engines of treated cast copper. They are used upon engines running at as high a speed as 600 revolutions a minute, and are not only cheaper than the old form of steel rod, but very satisfactory. No trouble has arisen from the treated copper bearings.

		1894.	1895.	Decrease.		Miles.
				Number.	Per cent.	
Bridgport and	Stratford.....	23,547	7,068	16,479	.6998	3.2
New Haven "	West Haven.....	8,234	6,619	1,585	.1925	2.4
New Haven "	East Haven.....	5,619	2,203	3,416	.6080	6.0
Meriden "	Yaleville.....	13,758	3,002	10,766	.7810	3.0
Hartford "	Rocky Hill.....	7,558	6,367	991	.1300	8.0
Union City "	Waterbury.....	23,124	3,107	20,017	.8557	4.0
Naugatuck "	Waterbury.....	48,672	6,051	42,621	.8757	5.0
New Haven "	Woodmont.....	8,580	3,275	5,305	.6183	6.4
Bridgport "	Southport.....	20,718	15,617	5,131	.2473	6.6
Meriden "	Wallingford.....	34,237	24,548	9,689	.2830	6.0
So. Norwalk "	Rowayton.....	33,606	21,814	11,792	.3509	2.1
So. Norwalk "	Winnipauk.....	808	102	706	.8738	3.2
Derby "	Ansonia.....	2,479	2,225	254	.1025	1.9
Birmingham "	Ansonia.....	12,020	10,410	1,620	.1348	1.9
Total.....		243,000	112,628	130,372	.5365	

ford, some 9 miles distant. The case fell under the provision of the general electric railroad law, which forbids a line parallel to a steam road unless the projectors shall have satisfied a Superior Court judge of its public necessity and convenience. Judge Hall found against it on the question of fact, holding, apparently, that the rule of public convenience and necessity applied with equal force whether a trolley company owns its roadbed or is laid upon a highway, and that upon the street railway rests the burden of proof. As the steam companies claim unlimited power to multiply trains, especially if equipped hereafter with trolleys, this burden of proof may prove an obstinate barrier to parallel trolley enterprises, if Judge Hall's opinion prevails.

But it has been in the present legislature that electricity has met its most serious defeats. Under adverse committee reports parallel after parallel has been thrown out. In two of these cases the deadly decision was made

Tests made at the Washington Navy Yard show the treated copper to be pure, and, on a test bar 14 in. long and 1 in. on the faces, showed an elongation of $\frac{3}{4}$ in. and an ultimate breaking strength of 37,800 lbs. Other tests made in Chicago, show the ultimate breaking strength to be between 36,000 and 38,000 lbs. The ultimate strength of ordinary cast copper is 24,781 lbs.

It is claimed that no alloy is used in the process of treating, and that the process is not expensive and can be applied to a quantity of copper necessary to make the largest castings. The treated metal can be worked successfully with the planer, lathe, dies and rolls, or can be drawn into wire. The metal is considered by the makers superior to any other, for bearings for heavy engines, locomotives and cars.

Regulating Valve for Direct Steam Heating.

During the discussion on Car Heating at the May meeting of the Western Railway Club, Mr. D. M. Waitt, General Master Car Builder of the Lake Shore & Michigan Southern, spoke of a regulating valve with which his cars are supplied. By means of this valve the quantity of steam admitted can be regulated down to a very

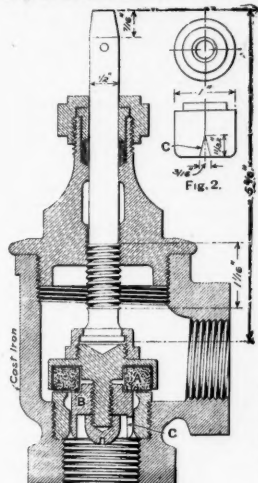


Fig. 1.

The thread on the stem has a $\frac{1}{16}$ -in. pitch, giving the valve a rather slow opening.

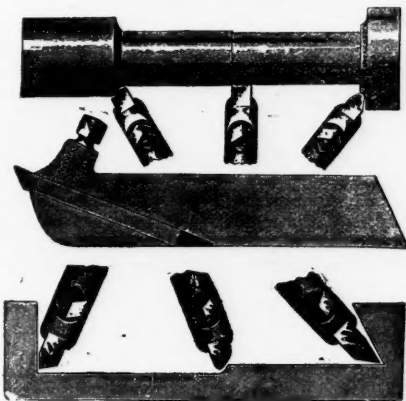
The valve proper is of brass with a Jenkins disc, A, which seats on a brass lashing screwed into the iron body. This disc is held in place by the brass piece B, with a nut below it. This piece is better shown by Fig. 2. A notch, C, $\frac{3}{16}$ -in. wide and $\frac{1}{2}$ -in. long, is made in the cylindrical part, which fits snugly into the lower part of the brass bushing. The upper edge of the brass bushing is made somewhat larger than the lower, and a groove $\frac{1}{16}$ -in. deep is just below it.

By one full turn of the valve stem, the valve is raised until the apex of the notch is even with the lowest edge of the groove in the bushing. Another turn raises the valve enough to give an opening of $\frac{1}{16}$ -sq. in. for the passage of steam.

At the full height of the valve there is a clear opening through it equal to the area of a 1-in. pipe. The purpose of the groove is to allow the steam to expand before passing the Jenkins' disc, and thus avoid the cutting of the disc which otherwise would occur.

The Armstrong Tool Holder.

The illustrations show views of a new tool holder made by The Armstrong Bros. Tool Co., of Chicago, for which several advantages are claimed. The tool holder is a steel forging case-hardened, and the cutter, which fits into a square slot drilled into the holder, is of self-hardening steel. The shank of the holder is $2\frac{1}{4} \times 1\frac{1}{2}$ in., and



The Armstrong Tool Holder.

The tool steel used is $\frac{3}{4}$ in. square. The set screw for holding the cutter is of tool steel with tempered point. The tool is made both right and left, the right hand tool being useful in heavy boring. It is especially adapted for the economical use of self-hardening steel, and in general lathe and planer work is claimed to be a practical substitute for forged tools.

A New Boiler Cleaning Compound.

A great many more or less, and generally less, valuable boiler-cleaning compounds have been brought forward in late years for the prevention of scale formation and corrosion in steam boilers. The majority of these depend upon the use of vegetable acids and caustics, which precipitate the scale-forming constituents in the water or dissolve scale already formed.

Recently we had brought to our notice a compound which has had extensive trials in this country and in Europe, and which has given satisfaction to its users. The process in question seems to consist principally in the formation of a protective covering on the interior surface of the boiler, which coating or enamel resists the action of acids and the corrosive agents usually found in feed water. The heat-transmitting power of the

metal of the shell is not seriously, if at all, impaired by the presence of this coating on account of its extreme thinness. From what we can learn from those who have used the compound, it does not injure the material of the boiler even after extended use, and in the prevention of incrustation and corrosion it is highly successful. The compound was tried for one year on a freight engine running on the New York Central Railroad, and during that time the boiler gave no serious trouble from scale or other results of impure feed water. This compound was thought by the officers of the railroad, after this trial, to be better for locomotive use than any other which had come within their experience.

Mr. S. Higgins, the Superintendent of Motive Power of the Lehigh Valley Railroad, has also had some experience with the compound in question. On engine No. 522 it was used from Jan. 11, 1895, to Feb. 11, one pound being used a day. At this time the amount was cut down to 2 lbs. a week, the total amount used to July 1 being 73 lbs. The washings showed soft mud and some scale. The boiler was clean when the use of the compound was begun. With the boiler of engine No. 642 the use of the compound was commenced on Jan. 19, one pound a day being used up to Feb. 16, at which time the amount was reduced to 2 lbs. a week on account of crown sheets and flues leaking. From this time up to May 1, 2 lbs. a week were used, when it was found necessary to shop the engine on account of excessive leaking of the crown sheets and flues. The boiler had been in service 13 months before the use of the compound was commenced, and the fact that soon after its use the crown sheets and flues began to leak would indicate that the compound was loosening up the scale. An examination was made of the boiler when the engine was shopped, and quite a heavy coating of scale was found remaining on the flues and crown sheets. On engine 663 the use of the compound was begun April 21, 2 lbs. a week being used, the total amount to July 1 being 22 lbs. This engine had a new boiler which was perfectly clean when the use of the compound was begun. The washings showed soft mud.

The only information that we have obtained concerning the use of this substance in marine work has been from the Chief Engineer of the steamer Richard Peck, of the Fall River Line. Upon this vessel the use of the compound has been going on for 10 months past with satisfactory results. The experience of those using it has been that great judgment is required in the amount to be applied. In this case 5 lbs. a day was used in each of the boilers, of which there are six, being Scotch boilers of 700 H. P. each, carrying 160 lbs. of steam, the object being to prevent corrosion. The best and quickest way of applying it was found to be through a cup on the top of the boilers. There seems to have been, during the time of use in this case, no indication of any corrosion of the metal of the boiler, although the iron had been cleaned off as completely as though the boilers had just been put into service.

The Standard Oil Company has used the compound in boilers at its works at Bayonne, N. J., with very satisfactory results. The water used is from the Passaic River, containing vegetable matter and magnesia. In three boilers, which had been treated over four months, an examination showed entire freedom from scale or deposit, with a black coating of hard or thin enamel on all internal parts below the water line.

The exact composition of the compound we do not know, but it contains mercury in combination with sodium and sodium carbonate. The latter makes the water alkaline, and mercury in a free and finely divided state is mechanically thrown against the surfaces of the boiler, where, the makers claim, it forms with the iron or steel an oxide of mercury which constitutes the enamel. Were it not for the alkaline state of the water, galvanic action between the metallic mercury and the boiler shell would occur, which would result in the wasting away of the metal of the boiler.

The formation of the oxide is said to be dependent upon heat and pressure.

The Empire Boiler Cleaning Co., of 19 Whitehall street, New York, makes the compound just discussed.

Principles of Block Working.

BY C. C. ANTHONY.

As the signal rules of the American Railway Association have lately been under discussion, and the English standard block signal rules have been placed before American railroad men, it may be well to inquire into the principles of block working. In making a comparison of a few English and American codes of signal rules in the light of a practical acquaintance with the daily working of a number of block signal towers (using a lock and block system), I was led to determine for myself what were the true principles on which the regular series of steps in block signaling should be based. These principles, with some reasoning relating to them, I will give. Possibly block working will increase the safety of train movements, no matter what method is followed, or how crude or careless the instructions may be. But experience shows that block signaling sometimes fails and disastrous errors are made. The block system is an important improvement; but that is not sufficient; the block system itself must be improved and made as efficient as possible. And one of the problems is so to arrange the prescribed routine that the chance of error will be as small as possible.

Following the suggestion of the editor of the *Railroad Gazette*, let A, B, C, etc., represent consecutive block stations or signalmen and let it be understood that

trains run from A toward C in each case. It is sometimes said that an element of safety in ordinary block working is the fact that two signalmen have to co-operate in signaling each train, and that one checks the other. Let us see whether this is true. Considering the block B C, the chief business of B is to protect the rear of each train so long as it is in the block; and the chief business of C is to note and record the passage of each train out of the block. Each man must do his part of the work for himself; there is no co-operation and no check so far. But, in order that block working may be carried on, it is necessary that there should be communication between B and C. And the second duty of B is to indicate to each engineman whether it is alright to enter the block, in accordance with information received from C; and the second duty of C is to report to B when each train passes out of the block, or to advise B, in reply to his inquiry, if it is right for a train to enter the block. Still there is no co-operation and no check. For when B clears his signal he simply repeats to the engineman the information received from C—that the last train has passed out, or, the block is clear; and C alone is responsible for the information on which B acts. B and C do not unite their independent knowledge in doing a certain thing; therefore we cannot say that they co-operate. And in the simple block work just outlined there is no check, for a check would consist of such an arrangement of the necessary steps, or such additional steps as would tend to neutralize the effect of some possible error in the work. The simple routine seems to provide only what is necessary in doing the work; true co-operation does not occur and I think we shall have to look farther for a check upon errors.

There are two simple methods of block working, each of which is in use, I believe. Under the one plan C notifies B of the passage of each train out of the block B C, and B admits each train on condition that the last train has been reported clear by C; that is, the blocking is based on clearances. Under the other plan trains are not reported clear by C, but B, when a train is approaching, asks C's permission to admit the train to the block; if C is satisfied that the last train that entered the block has passed out, he gives permission or "accepts" the train. B then gives a clear signal. So we may say that the blocking is based on acceptances.

There are several possible errors in working by clearances. B may misunderstand some other bell or telegraph signal from C as the signal that a train has cleared; of course this error may be guarded against in a measure by the requirement that each signal shall be repeated back to show how it is understood, or by other precautions. C may, by mistake, report "train out of block" to B instead of to D, for a train moving from D toward B. B may record on his sheet or book the clearance of a train at A in the column for a train going toward C, and, on referring to his record later, may be satisfied that the block B C is clear. Or he may, by mistake, make any other entry in the place for a clearance at C. In practice B will not always refer to his record before clearing his signal; he may then clear his signal for an approaching train, under the mistaken impression that the block is clear when it is not. In ordinary situations the blocks will be clear in most cases when trains are approaching; it will therefore be the usual course for the signalman to clear his signal at once when a train is announced to him. He may sometimes do this from force of habit when the block is not clear.

In working by acceptances alone there are several possible errors, somewhat similar to those that may occur in working by clearances. C may, by a wrong entry on his record, make it appear that the block B C is clear when it is not and may then be led to accept a train improperly. He may accept a train under the mistaken impression that the block is clear when it is not. In ordinary situations the blocks will be clear in most cases when trains are approaching; it will therefore be the usual course for the signalman to clear his signal at once when a train is announced to him. He may sometimes do this from force of habit when the block is not clear.

Each of the simple modes of block working is defective and leaves the way open for serious errors. The effect of combining the two may next be considered.

If the block work is based upon both clearance and acceptance and it is understood that neither may in any degree take the place of the other and that each is absolutely essential, then before a clear signal is given for a train to enter a block—

1. The "train out of block" signal must have been received for the last train that entered; and
2. Permission to admit a train must have been obtained from the signalman in advance.

Taking up the possible errors suggested above: If B by misunderstanding a bell or telegraph signal, supposes that the block is clear when it is not, he must still ask C's permission before admitting a train, and the chances are that C, knowing that the block is not clear, will refuse permission and prevent any serious result from the original error. The case will be the same if B, from any other cause, wrongly understands that the block is clear, or if he trusts to his (wrong) impression without referring to his record. B will not clear his signal at the wrong time "from force of habit" because he will be in the habit of asking permission first. Of course B, when hurried or confused, may clear his signal without

stopping to consider whether the block is clear or to ask permission; but such an error can hardly be provided for except by mechanical checks. Since a clear signal must not be given unless the last train has been reported clear, if B, knowing that the block has not been reported clear, should ask permission to admit a train, and C should, through any error, give it, B would not clear his signal.

In general, so far as the errors under consideration are concerned, a wrong clear signal will not be given unless errors on the part of both signalmen coincide; and the probability of such a coincidence is far more remote than the probability of an error on the part of one man. There is thus provided from the simplest elements an effective check against certain errors.

It may be objected that B is still entirely dependent upon C for his information that the block B C is clear and that, in combining the two modes, it is merely provided that the same ground shall be gone over twice without any real gain. It is true that B depends upon C for his information; but the apparent repetition really constitutes two distinct steps, the value of which comes about in this way. As each train passes out of the block C voluntarily, *spontaneously* informs B of the fact at or about the time when it occurs. The information so given—not as a possibly hasty answer to a question—makes B as sure as he well can be that a train has in fact cleared the block. It is to be observed that C cannot, in strictness, say "block clear"; unless he can see the whole length of the block he does not know what *may* have got in; he can only say what he sees, "a train out of block." But B should have knowledge of each train that enters and if he receives that information for each one he may be well satisfied that the block is clear at a given time. Nevertheless there are possible errors in the information or in B's action if he be at liberty to admit another train without further formality. Accordingly the second distinct step is taken. Before admitting another train B asks C's permission; that is, *consults* C. If C gives permission it is plain that the beliefs and records of the two men agree—that the block is clear. But if there is any error in the first step the chances are that C will disagree and, by refusing permission, will check the error.

It remains to be considered on what basis the signalman should give or refuse permission for a train to enter the block. Let us assume that it is not deemed improper for C to repeat his permission for a given train, if asked to do so, and that he is expected to refuse permission only when there is a train in the block. Evidently if B should some time fail to announce to C a train that entered the block and should presently ask permission for a second train, C would be likely to give the permission under the impression that he was merely repeating that for the first train. The true conditions may be expressed in this way. Normally the block B C is "closed"; there is no train in it and none is approaching (past A); the signal at B is at danger. When C accepts a train he must consider that the block is "open"; the signal at B is or may be clear. Practically the blocks B C and A B are then united and form one section, A C; presumably (since B ordinarily gets a train accepted by C when it passes A) there is a train in the section A C with a clear road to C. There can be no occasion to give a second permission for this train, and in fact C, assuming that a train is approaching from A (without regard to the announcement showing that it has passed B), should be on his guard not to give a second permission, from the moment the first is given till, upon the arrival of a train at his station, that permission ceases to be in force. Only the typical block work is here in view; the case of a train that, after being accepted, does not pass B, is not considered.

In conclusion these principles of manual blocking may be stated:

1. It is essential that each train that passes out of a block should be reported by the signalman at the end of the block to the signalman at the beginning.
2. The giving of a clear signal or its equivalent, for a train to enter a block, should depend upon the condition that the last train that entered has been reported out in the regular course.
3. The giving of a clear signal or its equivalent, for a train to enter a block, should depend upon the permission of the signalman at the end of the block.
4. A permission given for a train to enter a block remains in force until a train comes through that block.
5. The giving of a permission for a train to enter a block should depend upon the condition that no previous permission is in force.

TECHNICAL.

Manufacturing and Business.

Pennock Brothers, who have for some time operated the long established car works at Minerva, O., announce that the firm will sell or lease that plant on favorable terms. This decision has been brought about by the forced retirement of Mr. Willard Pennock from business by ill health. Mr. Pennock was stricken with paralysis on July 30 and will not be able to resume business for a long time. The plant has a good location and has a capacity of turning out 10 cars a day. The buildings are located on a tract of land including about eight acres, which is reached by the Pennsylvania and two other railroads, the company owning sidings connecting the buildings with each line.

The Fowler Car Works at Elizabethport, N. J., were sold Aug. 8, by the Sheriff on account of a mortgage of

\$40,000 held by H. H. Isham, of Brooklyn. The works were bid in by P. H. Gilhooly for \$30,000. The machinery, lumber, etc., brought about \$10,000 more. The works were built about two years ago, by Mr. Fowler, after his retirement from the Lewis & Fowler Company of Brooklyn. The plant is well adapted for building street cars.

The Bass Foundry and Machine Co., Fort Wayne, Ind., has just secured an order from the Lake Street Elevated Railroad of Chicago for 240 steel tired wheels, the Krupp tire being specified. The works at Fort Wayne are very busy in all departments.

The Buckeye Malleable Iron & Coupler Co., of Columbus, O., manufacturers of the Buckeye coupler, have recently received an order from the Schenectady Locomotive Works for four tender couplers and a number of orders for freight car equipment.

New Stations and Shops.

The foundation for three of the shops to be built by the H. C. Frick Coke Co., at Scottdale, Pa., where the company is to erect a car building plant, has now been completed. The buildings will be ready to start up by the fall, and will employ 100 men at first. The car shops are located on a tract of land between the Pennsylvania and the Baltimore & Ohio tracks. The shops will be engaged in repairing the thousands of coke cars used by the H. C. Frick Co., and the erection of new cars will also be undertaken at the shops when necessary.

The construction of a new freight house has been begun by the Southern Railway Company at Lynchburg, Va. It will be 388 ft. long by 63 ft. wide at the widest part, and will be of brick, three stories high, have an elevator, and a bridge from the building, over the tracks to one of the city streets.

Interlocking.

The Wabash and the Chicago, Peoria & St. Louis have come to an agreement concerning the erection of interlocking signals at the crossings at Fifteenth street, Springfield, Ill., and the apparatus will soon be put in.

Delays on the Delaware River Bridge.

Considerable trouble has been experienced with the caissons for the foundations of the Pennsylvania's new bridge over the Delaware, above Philadelphia, owing to the high tides in the river. Several weeks ago the caisson for the draw span pier was swept from its moorings and driven a short distance up the river. The caisson for pier 2 was upset at the same time. This pier was afterwards righted, filled with water and sunk to the bottom of the river, where it was anchored, but on Aug. 3 was again overturned. Luckily, neither caisson was being sunk at the time. These accidents have necessarily delayed the work considerably.

Trial Trip of the Gen. C. B. Comstock.

We described on page 347 of the current volume, the seagoing dredger Gen. C. B. Comstock, which was launched from the yards of Hugh Ramsay, at Perth Amboy, on May 25. The vessel is intended for use in the harbor improvements at Galveston, Tex., and is fitted with specially constructed Bucyrus dredges and engines, designed by Mr. A. W. Robinson, Chief Engineer of the Bucyrus Steam Shovel & Dredge Co. A trial trip of the engines, pumps, etc., was made on Aug. 3, the vessel going out to sea beyond Sandy Hook and there discharging its load. The maximum combined capacity of the two hoppers is about 575 cu. yds. The contract prices of the vessel was \$86,000. The trial trip was a complete success.

Blast Furnace Production.

The weekly capacity of the furnaces in blast throughout the country, reached a total of 176,505 tons on Aug. 1, according to the figures of the *American Manufacturer*. This is higher than at any time since Dec. 1, 1894, when the capacity was 178,325. At no other time during 1894 was this figure reached, the average for that year being about 123,900 tons. During 1893 the present figure was exceeded in March, April, May and June, but at no other time during that year. The figures for these months were 177,210, 182,169, 186,982 and 177,407 tons respectively.

German Manufacturers and the Standards.

The Society of German Civil Engineers, wearied of fractions of an inch, has agitated for some time past a change to the metric system from the Whitworth's and Sellers' standards for the threads of bolts, nuts and screws. This proposition is opposed by a formidable array of 130 of the most prominent German industrial firms, private and corporate, who have memorialized the government authorities at length urging no change from present methods, unless an international agreement could be brought about of all the manufacturing countries of the globe for a standard to be used in all new work after a certain fixed date. A change by Germany alone would raise an additional obstacle in the way of such an agreement, would put that country to many millions of unjustifiable expense and would be detrimental to its export trade.

The Diamond Shoal Lighthouse.

The problem of erecting a permanent light upon the Outer Diamond Shoal, off Cape Hatteras, one of the roughest points on the coast, has been before the Lighthouse Board for a number of years. About three years ago the firm of Anderson & Barr, of Jersey City, attempted to sink a caisson off the shoals, but it was broken up during the operation. A framework was placed there some time ago, for the purpose of making borings and determining the nature of the bottom. This was described and illustrated in the *Railroad Gazette* for June 22, 1894. The Shoal is sand to an indefinite

depth. The framework has been left in position, and the effect of the heavy seas upon it noted. It has not shifted greatly, nor has it been badly damaged by the sea. The plans for a permanent structure are now being prepared by the Lighthouse Board.

The Fall of the Ireland Building.

The large 8-story building in course of erection at the northeast corner of West Broadway and West Third street, New York, known as the Ireland Building, partially collapsed on Thursday, Aug. 8, carrying down in its fall a number of workmen, of whom 15 are known to have been killed or to have died from their injuries.

The building is owned by John B. Ireland, and the architect was Charles R. Behrens. It is of the usual fireproof construction, has brick walls, cast-iron columns and steel framework. The floor beams and fireproof flooring of a section of the building, embracing the two spans adjoining a center column and extending upward throughout all eight stories, collapsed and fell into the cellar of the building. The east and west walls are bulged and unsafe and the various girder, column and flooring connections throughout the remainder of the building are damaged.

The foundations of the center line of columns through the building, are concrete, and are said to extend only about 10 ft. below the street level. The removal of the debris has shown that the base of one of these columns (there are four altogether) was driven through the masonry and concrete of the foundation, breaking the base plate and penetrating so far that only a few feet of it remained above ground.

The cause of the accident has not yet been determined. The presence of quicksand under the piers of the columns has been suggested, as has also the overloading of the floors with building material. The latest investigations report the presence of an old well near the base of the pier of the sunken column.

THE SCRAP HEAP.

Notes.

A dispatch from Key West, Aug. 7, states that several railroad bridges have been blown up with dynamite by the insurgents near Sancti Spiritus, Cuba.

The express companies doing business in Minnesota evidently intend to contest the law recently passed in that state declaring such companies common carriers and placing them under the supervision of the State Railroad Commission.

It is reported from Ottawa that the New Zealand government has granted an annual subsidy of \$100,000 to Pacific steamers for calling there for mails to and from Great Britain, which the Canadian government has agreed to carry across the continent free of charge.

The Brooklyn Heights Railroad Company, Brooklyn, N. Y., is to put 1,500 Crawford fenders upon its cars. The Railroad Commissioners of Massachusetts, acting under the law recently passed, have notified the street railroads to equip their cars with fenders by Nov. 14 next.

The shops of the Boston, Revere Beach & Lynn Railroad, near Boston, were burned on Aug. 9 with four locomotives; loss \$50,000. Several buildings connected with the Chesapeake & Ohio shops at Huntington, W. Va., were burned Aug. 8, together with 50 freight cars, some loaded. A fire in the yard of the Cincinnati Southern at Cincinnati on the same day destroyed 17 freight cars.

The City Council of Newton, Mass., has passed the final order under which work can be commenced on the extensive improvements in that city connected with the depression of the main line of the Boston & Albany (four-track) railroad for two miles through the thickly settled part of that city. This separation of grades is to be carried out in pursuance of a contract between the city and the railroad company, which was arrived at without the appointment of special commissioners under the law of 1890. The state, however, pays, we believe, a portion of the cost, the same as in cases of similar improvements which are ordered by the Superior Court. The first part of the work will be the widening of Washington street, an important thoroughfare which runs parallel with the railroad. After this is done, ground will be cleared on private property for temporary tracks to be used by the Boston & Albany during the lowering of its roadbed. There are three or four stations on that portion of the railroad which is to be depressed.

South American Notes.

It is interesting to note that the Brazilians realize the danger of the operatives on the state railroads becoming a factor in a political machine. A large number of employees on the Central Railway recently took action favoring the election of a candidate to the Senate. An order was promptly issued by the manager of the road against any collective political demonstrations by its employees.

An American firm has just completed a grain elevator for the Central Argentine Railroad at Rosario, having a receiving and loading capacity of 240 tons an hour.

The concessions for a railroad from Cherrepe, on the Peruvian Coast, to the coal regions of Hualgayoc, have been extended for two years from next November. The concessions are owned by a syndicate organized in the United States.

Fire Guards on the Canadian Pacific.

We recently noted that the Canadian Pacific had caused fire guards to be ploughed along 526 miles of its track, from Indian Head to Calgary. These consist of eight furrows each side of the track. We learn now that the contract was let at the rate of \$5.40 per mile of track, which seems cheap enough for 16 miles of ploughing, and takes off some of the force of the remark of a local paper that "this work has been done at great cost."

British Shipbuilding.

From returns compiled by Lloyd's Register of Shipping it appears that excluding warships there were 339 vessels of 707,079 tons gross under construction in the United Kingdom at the close of the quarter ended June 30, 1895. The particulars are as follows, similar details being given for the corresponding period in 1894:

Description.	June 30, 1895.		June 30, 1894.	
	No.	Gross tonnage.	No.	Gross tonnage.
Steam.				
Steel.....	257	667,141	300	656,820
Iron.....	24	3,935	34	7,376
Wood and composite.....	8	1,719	4	838
Total.....	289	672,795	338	665,034
Sail.				
Steel.....	32	31,990	31	49,691
Iron.....	1	226	1	225
Wood and composite.....	17	2,063	28	2,704
Total.....	50	34,284	60	52,620
Total steam and sail.....	339	707,079	398	718,204

The British Iron and Steel Trade.

The Board of Trade returns of exports of iron and steel for the first six months of the year are as follows:

	1895.	1894.	1893.	1892.	1891.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1,286,481	1,271,396	1,443,258	1,277,396	1,662,208	

The improvement shown this year is more than accounted for by the increased shipments of pig iron, which is the least profitable form of our exports of iron and steel. When we come, however, to examine these exports in detail, we see how serious is the decrease in the more important departments, and how they would seem to indicate that foreign competition is telling seriously on our exports of manufactured iron:

	1895.	1894.	1893.	1892.	1891.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Pig iron.....	395,325	376,712	390,820	392,591	351,909
Bar, angle and bolt.....	63,834	60,590	76,718	89,003	109,018
Railroad of all kinds.....	196,328	218,677	277,370	193,417	384,458
Hoops, sheets and plates.....	43,257	76,096	72,023	56,505	76,331
Galvanized sheets.....	94,041	83,731	81,183	76,570	78,974
Tin plates and sheets.....	178,704	152,191	217,567	216,777	306,206

It will be noticed how serious is the falling off under the heads of "bar, angle, and bolt," and "hoops, sheets, and plates," and this, we believe, is entirely due to the successful competition of continental makers, who are gradually taking away this department of trade from us. The exports of "railroads of all kinds" are a very important factor, but this item, of course, is affected by the amount of construction which is going on abroad from time to time. Lately this has been very slight indeed, and any change must be in the right direction, as shipments have fallen into the smallest possible compass. Fortunately, prices are exceptionally cheap, and, happily, we have little to fear from foreign competition in this department. Only a few years ago the shipments of rails averaged about 1,000,000 tons annually, but during the last four years the average was only about 600,000 tons. Although we may look for some railway extension in Africa at an early date, and perhaps in the East in course of time, this is too uncertain to build much upon at present. The movement in America, which is fast bringing prices up to about the level of imported goods, is likely to be checked at that point, as the capacity of production is enormous.—*The Economist*.

Snakes.

In New York City the reporters have lately had a good deal to say about a fake sea serpent. In West Virginia they have a little difficulty that is more businesslike. The report comes from Charleston to the effect that the work on the railroad which is building up the Elk River Valley, is being seriously hindered by the presence of rattlesnakes in such numbers that the workmen are in constant danger of being bitten. Already there have been no fewer than 10 men bitten, two cases proving fatal. It is said that the Italians are very much afraid of the snakes, and that the negroes will not work except where the ground has been cleared of all brush and weeds.

The M., S. & L. Line to London.

On the line of the Manchester, Sheffield & Lincolnshire extension to London, there are now nearly 7,500 men employed; 1,100,000 cu. yds. of earth have been moved; 7 viaducts, 55 bridges and 49 culverts are practically complete. The total expenditure to date on the extension is £1,342,000, and the estimated expenditure for the present half year is £1,500,000. The extension is about 92 miles long, from Annesley, which is 10 miles north of Nottingham, to the junction with the Metropolitan, at Quainton road. The work was distributed among five large contractors, and they now have temporary tracks laid for about two-thirds of the entire route. There is a tunnel near Rugby, upon which work is being done in six shafts, and six more are being sunk. Staffordshire blue bricks are used on all outdoor work where bricks are required. Bridges are made of stone, wherever possible. The slopes of cuts and embankments are made very flat, wherever possible. South of Nottingham no grade is to be steeper than 30 ft. per mile and no curve, except at important stations, is less than one mile radius (1° 5').

The Van Buren Street Viaduct.

The Illinois Central Railroad and the city of Chicago are engaged in a strenuous contest about the right to cross the tracks of the road at Van Buren street. The wide foot-bridge erected at this point for use during the World's Fair had never been taken down, being a convenient means of access to the pleasure boat wharves on the lake front, but recently the city government issued a positive order requiring its removal and the road last week went to work to tear it down. As the bridge was a decided convenience, the principal reason for requiring its removal, so far as can be seen, was the objection of some persons to it as unsightly. As soon as the passage over the bridge was blocked, foot passengers at once attempted to cross the tracks at grade, but the railroad police officers stopped this and then there was a row. On Aug. 6, one steamboat captain was arrested for attempting to force his way across the tracks. When other attempts to outwit the police had failed, a number of boats opened their steam whistles, and made such a noise that a crowd of 5,000 people soon gathered. A truce has been declared until Aug. 26, by which time it is hoped that the legal complications of the situation may be somewhat cleared up. A permanent crossing at grade is,

of course, out of the question as there are four or more main tracks and trains are very frequent. It appears that the railroad company is willing to build a smaller overhead footbridge, of more pleasing appearance, but the city officials are jealous of their prerogatives and seem to be aiming to get the road to agree to a plan of extensive alterations. The tracks at this point run parallel to the lake front; on the west side of the railroad lies the lake front park, which adjoins Wabash avenue. This avenue is about 7 ft. higher than the railroad tracks. There is a proposition to fill in on the eastern side of the park, making it about level, and to depress the railroad tracks so as to permit the construction of overhead bridges, without excessive elevation, at any point along the side of the park. The depression of the tracks for any considerable distance would be very expensive, of course; and besides that the railroad company protests that a depression of more than 4 ft. will be out of the question on account of the impossibility of providing suitable drainage. The present roadbed is but a few feet above the level of the lake. So far as we can learn, the demand of the public to have access to the territory between the railroad and the lake is not of great importance at present and will not be so until the park, which it is proposed to make on that ground, shall be ready for use.

Disembarkature of a Silvery Glean.

Main street wharf was crowded with hundreds of spectators yesterday morning when the first piece of rail for the San Francisco & San Joaquin Valley road was hoisted out of the hold of the Washtenaw's forehold. This now historical piece of metal, which has come over 16,000 miles by water to fulfill an important mission on land was rolled into its present form in Pittsburgh, and is 30 ft. long and weighs 650 lbs. This rail, with its 7,337 brothers, will make 36,690 yards of track, or a little over 20 miles. In a few months these 2,135 tons of steel will gleam quite silvery among the wheatfields of the great San Joaquin Valley. When the rail went over the steamer's side and was landed on the barge Planet, A. C. Stetson wrote in his book one tally, and the people on the dock cheered the noted disembarkature. "There goes the first piece of steel into the vitals of railroad monopoly in California," said an enthusiastic spectator.—*San Francisco Call*.

New Pennsylvania Railroad Ferry at New York.

The city authorities of New York have leased to the Pennsylvania Railroad a franchise for a new uptown ferry, from West Twenty-third street, on the New York side, the landing at Jersey City being near Grand street. The Pennsylvania at present operates a ferry from Jersey City to Desbrosses street, about 30 blocks or 1½ miles below Twenty-third street, as well as the Cortlandt street ferry. The Pennsylvania is to pay the City of New York \$22,000 for the franchise and 5 per cent. of the receipts collected at the New York side. The ferry will be in operation by January next.

Cuban Iron Ore.

The advance in the iron trade has caused such a demand for the higher grades of iron ore that a contract has just been closed for the shipment of 60,000 tons of ore from the mines of the Spanish-American Iron Co., at Daiquiri, Cuba, to Philadelphia. The ore will be brought to the piers at Port Richmond.

This contract follows one announced recently, by which 25,000 tons of iron ore were to be brought to the United States from the same mines in Cuba.

Garbage Crematories in Chicago.

The report of the committee appointed by Mayor Swift to investigate the garbage crematory in operation at Allegheny City, Pa., has been made, and is favorable to the adoption of crematories of this type for use in Chicago. It is estimated that 15 of these crematories consuming 40 tons of garbage per day will be necessary in Chicago, and the cost of operation is less than any yet inspected. The matter will be brought before the city council when it meets again next month. The crematory was of the Rider patent, and required only 1½ tons of slack coal for the consumption of 40 tons of garbage.

Interlocutions—No. 5.

"What's the difference between a good position block signal and a lazy flagman?" asked the Semaphore one morning.

"Give it up," responded the Crank in his usual laconic manner.

"One works without shirking and the other shirks without working."

"I can't consistently laugh at that," sneered the Crank, "a dull riddle and a poor pun are too much for me at one time."

"Oh, I didn't expect you to laugh," loftily retorted the Semaphore, "Crank only laugh at their own wit. But that's not what I was coming to. When I was a Distast Signal at a crossing plant down on the Eastern Division, we had a hide-bound old Superintendent who thought he knew it all."

"We'd had a couple of tail-enders that didn't amount to much, only smashed a few rotten box cars and killed a tramp, but coming right together they set the General Superintendent to thinking. One day he came over the road and asked our boss if he didn't think it was about time they put some kind of block signals on his division. Then the old man got mad. He had a pull with the General Manager, been at school with him when they were boys or something of that kind, so he always felt as if he could speak his mind. He asked the General Superintendent how he supposed they were going to get trains over the road if they took up with every dude notion that came along; said he had all he could attend to without any monkeying of that kind. The General Superintendent didn't say much, but he sharpened a knife for the old man right then."

"Well, things went along pretty smoothly for a couple of months till one night we had an awful snow storm. Then it was bad. Trains were six or seven hours late, and freights were stalled up all along the road. About 10 o'clock the old 'Cannon Ball' came by with the General Manager's car on the rear end. She stopped at the station all right, but couldn't get away, so after the engineer had sawed back and forth a half dozen times they sent out a flag. It was snowing so you couldn't see the tail lights much more than the length of a car, and it blew great guns. When the flagman passed me (I was only about 300 yards from the station) he was talking disgracefully; said there wasn't no train coming, that he wasn't no esquimaux, and swore on his mother's honor that he wouldn't go another rod to save the whole road from perdition. Right near me the trackmen had piled up some old ties to sit under while they ate their dinners, so what does the terrier do but put his lantern in the middle of the track and squat down under the shelter. He must have got drowsy, for in about half an hour along came the way freight with only three cars, running like a scared dog; he never showed a hand till the train had got by and I suppose something must have happened to his lantern—went out or got snowed under—I never knew, certainly,

for it was on my blind side. Anyway the freight engine buried her nose in the General Manager's car and the whole thing caught fire.

"The General Manager was at the telegraph office so he was all right, but the dorkie was in the front end of the car and had his head barked. When the flagman got onto what was up he lit out and they never saw hide or hair of him again."

"What became of the Superintendent and his pull?" sleepily asked the Crank as the Semaphore came down to let No. 8 go by.

"Oh, he didn't have a pull; he only thought he had one. The last I heard of him he was running a five-minute lunch counter out west somewhere."

Electric Excursion Cars in Brooklyn.

The Brooklyn Heights Railroad Company, which controls over 200 miles of trolley line in Brooklyn, N. Y., has introduced special cars for excursion parties. A number of these cars has been built by the J. G. Brill Co., Philadelphia, Pa., measuring 34 ft. and having a seating capacity of 60 persons each. They are mounted on two four-wheel Brill trucks and have General Electric motors. On festive occasions the interior and exterior of the cars are decorated with bunting and are illuminated by 175 16-candle power lights, making, especially on a dark night, a very attractive appearance. Six of these cars, containing railroad officials and newspaper men made a trial trip Aug. 7, starting from different points in Brooklyn and running out to Ulmer Park, a suburb. Such cars have been popular in various cities, and they have been well received in Brooklyn. The extensive system of the Brooklyn Heights road reaches many popular suburban resorts and there appears to be no reason why this new service should not be made a paying one. Closed cars, similarly equipped, will be built for theater parties. The rental for an evening is \$20.

Railroad Building in Japan.

In a report upon the trade of Yokohama, Mr. Consul Troup speaks of the impulse that has been given to the construction of private railways in Japan. A series of new railway lines and extensions, was, he says, sanctioned by the Diet in May of last year, and at the end of October last Japan had 994 miles of railway under construction, in addition to 1,938 miles open for traffic. About one-third of the money expended by Japan on railway construction is spent abroad, and chiefly in England. The rails are of English make, and other material, such as wheels, springs, buffers, and axle bars, are generally from England. Belgium and Germany contribute to the supply of bridge work, and the lighter work of this kind supplied by Germany is, we are told, more in favor for private lines. Some portion of the locomotives are obtained from this country, but the American locomotive also finds extensive favor. "Japanese engine-drivers," writes Mr. Troup, "find, it is stated, that the American engine can be made to steam more easily than its English rival, although this is, it would seem, at a considerably greater cost, for it is estimated that the American engine costs 10 per cent. more, and burns 30 per cent. more fuel to do the same work." Mr. Troup suggests that it would be to the interest of British producers of railway material, as well as of those who supply electric light material, and other manufacturers of metal, to have expert agents in Japan, with detailed specifications at hand when inquiry is made; and as the work of development, partially interrupted by the war, is now likely to be actively resumed, the present seems an opportune time for acting on this advice.—*The Economist* (London).

Lake Notes.

The new steel ship Victory, the largest vessel ever launched on the Lakes, on a draft of 14.3 ft., Saturday took from Duluth as her first cargo 3,629 gross tons of ore. The vessel should easily carry 6,000 net tons on 18 ft.

The steel steamship Yale, capacity 6,000 tons, on deep draught, and the steel steamship Penobscot, of the same size, were launched at Cleveland and West Bay City, respectively, Saturday last. One will be in the ore and the other in the package trade. Each cost about \$200,000.

In addition to the two 6,000 steel schooners contracted for by the Minnesota Iron Co. at the Chicago Shipbuilding yard a week ago, a Cleveland syndicate has contracted for another of the same class to cost \$175,000. This company has now under way, including the Zenith City, 24,000 tons of freight tonnage, the largest amount in its history.

Plans have been prepared by the Northern Pacific for improvements at the dock front in Duluth, now occupied by a coal company, to cost \$150,000. The improvement will include a slip 1,420 ft. long, docked and warehoused on both sides. The full water frontage will be 7,900 ft., and from 15 to 20 large lake vessels can be handled at one time. There will be four tracks. The dock space has become too valuable for coal storage.

Unprofitable Lines.

In the half yearly report of the Great Eastern Railway (England) mention is made of the special efforts to curtail expenditure on unremunerative lines. Efforts have been made to reduce train mileage and save fuel and wages, but with only small success. The directors have felt bound to consider very carefully the requirements of the agricultural districts where these lines of light traffic lie and have not felt that they were justified in cutting down the service to such an extent as to make any appreciable economy, although much of it is being done at a loss.

Ice Crushing Transfer Boats for Siberia.

The Detroit Dry Dock Co. will build on the shores of Lake Baikal, Western Siberia, three great ice crushing transport ferries to operate in connection with the Great Siberian road, for the Russian Government. The vessels will be modeled after the St. Ignace and Sault Ste. Marie, which were built for the Duluth, South Shore & Atlantic road for all-year use across the Straits of Mackinaw. Here they are often compelled to break ice windrows 5 ft. thick, which they do with ease. The vessels are built with two wheels, one as ordinarily, at the stern, for propulsion, and another smaller one at the stem, working against the propelling force to create a current under the ice ahead to break it up. The boats carry 30 loaded cars and make 10 miles an hour through ice a foot thick. They have never been delayed more than a few hours. The new Russian vessels will be larger and will have 7,000 H. P. each. All machinery for the Lake Baikal vessels will be built at Detroit.

Lake Street Elevated, Chicago.

The Wabash avenue extension of the Lake Street Elevated will probably be opened Aug. 26. The stations at State and Clark streets are nearing completion, and almost all the track has been laid. The interlocking by the junction at Market and Lake streets will be put in of the National Switch & Signal Co.

Mr. Carnegie and English Rolling Stock.

The views of Mr. Andrew Carnegie on the subject of railways, even if they come from "the largest individual freighter in the world"—an easier thing to say than to prove—are not of overwhelming importance. Mr. Carnegie is, no doubt, a very big man at Pittsburgh, but his influence in the world at large is limited, and his eccentricities are rapidly reducing it to vanishing point. Still his prominence as a capitalist justifies me in quoting his opinions for the benefit of English readers. Writing to the editor of an engineering paper who asked him for an article, which he had not time to write, Mr. Carnegie says: "Britain, in her railway system, has to labor under a disadvantage of being the pioneer in railway construction. It would pay her to make a bonfire of her equipment, both freight and passenger, and charge its replacement, upon the American model, to the national debt. This you know as well as I do; but it were easier to remodel the British constitution, as you also know better than I do."—*Transport*.

We are astonished that even Mr. Carnegie, who is not always discreet when he gets hold of a pen, should mislead the innocent by such a sweeping and obviously preposterous generalization. We expect it from Colonel Jefferts, because it is his business to reform English rolling stock. We expect it also from the crude philosopher from Kalamazoo or Tuskegee, whose information is slender and whose thought-engine is running fast and hot, but Carnegie ought to know better and probably does. Only he did not stop to think of his responsibility to the public.

RAILROAD LAW—NOTES OF DECISIONS.**Powers, Liabilities and Regulation of Railroads.**

In the Federal Court it is held that the receiver of a railroad should not be removed for making misleading reports when it appears that he has continued the existing method of accounting and reports, without intentionally misstating or misrepresenting the company's true condition; that it is not improper for him to procure supplies from or enter into contracts with the company composed of the superintendent and other officials of the railroad; and that he may give an unusually low rate, in order to introduce into general use a cheap and valuable article, which, if brought into general demand, would add to the freight receipts of the roads handling it.¹

In Illinois the Supreme Court rules that land of a railroad, used only for a right of way, may be specially taxed for a local improvement consisting of a sewer in an adjoining street.²

In the Supreme Court of the United States it is held that the reasonableness of a passenger rate of a certain amount per mile fixed by the legislature must in the case of a railroad be determined by its effect on the net earnings of the company on its entire line within the state, and not by its effect on any subdivision, even though it was once a separate road.³

In New Jersey it is ruled that neither the statutes of the state nor the policy of the law forbids the giving of a mortgage on a railroad not yet built, or on property not yet acquired by the corporation.⁴

Carriers of Goods and Injuries to Property.

In Alabama the Supreme Court rules that where the seller contracts to deliver goods "f. o. b." at the place to which they are to be shipped, and pays the freight to such place, on the arrival of the boat by which the goods are transported at such place the carrier ceases to be the agent of the seller and becomes the agent of the purchaser, and the seller cannot maintain an action against the carrier for injuries to the goods after such arrival, and before they were unloaded.⁵

In Texas it is laid down that where a duty is imposed by law on a railroad to water and feed stock in transit, it is not relieved from liability by showing that the shipper had undertaken that duty, if it appears that by its acts it prevented the shipper from performing it.⁶

The Supreme Court of Minnesota holds that an insurance company, which by the express terms of its policy has been absolved from liability because of a stipulation contained in a bill of lading of the insured property, whereby the carrier liable for the loss is to have the benefit of the insurance, has the right to impose, as terms of payment of the loss, that it have the unqualified right to proceed against the carrier primarily liable to the insured.⁷

In Texas it is held that though a stock-shipment contract relieves the carrier "from liability of every kind," after the stock shall have left its road the shipper may recover for injury to the cattle while on such carrier's line, though such injury developed or became apparent after the cattle had left that line.⁸

In the Federal Court it is ruled that an interstate carrier which enters into an arrangement with a connecting carrier for through billing, rating, and loading, and for the use of its tracks and terminals, is not obliged to make the same arrangement with other connecting carriers, though the physical facilities for an interchange of traffic are the same.⁹

And in the same case it is said that the interstate carrier does not subject another carrier to an "undue or unreasonable disadvantage" by exacting the prepayment of freight on all property received from it at a given station, though it does not require charges to be paid in advance on freight received from other individuals and competing carriers at such station.¹⁰

Injuries to Passengers, Employees and Strangers.

In California, where a railroad maintains several depots in a city, each depot is an "intermediate station," within the meaning of the code, empowering passengers to stop at intermediate stations.¹¹

In Texas, where a passenger is carried beyond his destination and alights from the train at another place, and receives injuries which result from the manner and not the place of such alighting, the negligence of the company in carrying him beyond his destination is not the proximate cause of such injury.¹²

In Texas the plaintiff, in company with her nephew, a boy of six years, was in a Pullman sleeper and requested the porter and conductor to awake her in time before reaching her destination. They failed to do so and she was carried past the depot, when the train was stopped and the boy was put off by the porter, but, before plaintiff could alight, the train was again started. After going some distance it was again stopped and plaintiff was allowed to alight. The Supreme Court rules that her damages should be confined to what she suffered on her own account and that it was error to allow her to recover for mental anguish because of the fright or distress of the child which was with her.¹³

In Texas, unless so notified, a railroad is not charged with knowledge that a person intends to leave its train as soon as he has bidden good-by to a passenger. One who gets on a train to say good-by to a passenger is bound to take notice of the time the train will start.¹⁴

In Georgia it is held by the Supreme Court that where

a carrier cannot limit its liability by any notice on tickets sold, a railroad company cannot, after selling a return ticket, exact, as a condition of return on the ticket, that the passenger shall sign it before a given agent, who shall stamp it, though the ticket was sold at a reduced price and recited such condition on its face.¹⁵

In Pennsylvania it is held that the statute of that state directing railroads to receive and transport cars, without delay or discrimination, of a connecting road, does not oblige it to move such cars when not provided with the appliances which ordinary care requires for the safety of the crew, and therefore does not relieve them from liability to their employees in negligently doing so.¹⁶

In the same case it is held that it is the duty of a railroad to its brakemen to take ordinary care that the ends of freight cars be furnished with such handles, ladders or safeguards as are in common, ordinary use on railroads.¹⁷

The Supreme Court of Texas rules that railroads must inspect cars received of another company with the same care given its own, and the inspection of a particular car will not be presumed, in the absence of proof, from a custom to inspect all cars.¹⁸

In Missouri it is decided that the fact that deceased knew that the engineer, whose negligence caused the accident, was incompetent, and had so reported him to the company, is not a bar to a recovery if the danger in working with him was not so obvious that an ordinarily prudent man would refuse to work with him.¹⁹

In Indiana where none of the frogs at any of the switches on a railroad are blocked, no recovery can be had by a brakeman, experienced on that road, for injuries suffered from having his foot caught in one of them.²⁰

In Mississippi it is held that the maintenance by a railroad at a highway crossing of a board 9 ft. long by 10 in. wide, fastened to the top of a suitable post 15 ft. high, with the words "Railroad Crossing" on the board, in letters as large as the size thereof would allow, is a sufficient compliance with the law requiring a board to be erected and kept up, on a post sufficiently high, with the inscription "Look Out for the Locomotive."²¹

In the same state it is held that a railroad is not liable for the act of a brakeman who pushes a trespasser from one of its trains because the trespasser will not pay for the privilege of riding, the money not being demanded as fare, and the brakeman not having any authority to collect fares.²²

In Indiana, plaintiff, an active boy eight years old, in disregard of the engineer's warning, jumped on a freight train moving up a sharp grade, eight miles an hour, and clung to the iron loop on the car provided for that purpose, with one foot on the grease box of the truck. The Supreme Court rules that the fact that the trainmen saw him hanging there and did not stop the train, did not render the company liable for injuries received by him in jumping off.²³

In Pennsylvania the negligence of a pedestrian who pays no attention to the warning given by the gates being down at a railroad crossing, but passes onto the track, bars recovery for his injury by an approaching train, and it matters not that the gates were always down.²⁴

In New York it is decided that where the engineer, at a proper distance from a grade crossing, blew the whistle, as required by statute, and it so happened that the train was at the time near and under a bridge, the railroad company is not liable for injuries caused by the horses of plaintiff, who was at the time driving over the bridge, taking fright at the whistle.²⁵

In Texas it is held that a railroad is liable for the act of a conductor who, having ordered a trespasser from one of its trains, shoots him while he was in the act of alighting, unless the shooting was not done for the purpose of forcing the trespasser to get off, but from personal resentment. But if before being shot, plaintiff had alighted, and had reached the ground, the company would not be liable.²⁶

¹ Clarke v. Central Railroad, 66 Fed. Rep., 16.

² C. & A. v. Joliet, 39 N. E. Rep., 1,077.

³ St. L. & S. F. v. Gill, 15 S. Ct. Rep., 484.

⁴ Baker v. Guarantee T. & S. D., 31 Atl. Rep., 174.

⁵ Capehart v. Furman, F. L. Co., 16 South. Rep., 627.

⁶ G. C. & S. F. v. Gann, 23 S. W. Rep., 349.

⁷ Southard v. M., St. P. & S. M., 62 N. W. Rep., 412.

⁸ F. W. & D. C. v. Daggett, 28 S. W. Rep., 525.

⁹ L. R. & M. v. St. L. W. Ry. Co., 63 Fed. Rep., 775.

¹⁰ L. R. & M. v. St. L. W. Ry. Co., 63 Fed. Rep., 775.

¹¹ Robinson v. S. P., 38 Pac. Rep., 94.

¹² P. & P. v. Woods, 28 S. W. Rep., 416.

¹³ P. P. Co. v. Trimble, 24 S. W. Rep., 96.

¹⁴ M. K. & T. Ry. Co. v. Miller, 27 S. W. Rep., 905.

¹⁵ Phillips v. Georgia R. & B. Co., 20 S. E. Rep., 247.

¹⁶ Dooner v. D. & H. C., 30 Atl. Rep., 263.

¹⁷ Dooner v. D. & H. Canal Co., 30 Atl. Rep., 269.

¹⁸ Eddy v. Pentice, 27 S. W. Rep., 1,063.

¹⁹ Francis v. K. C. St. J. & C. B., 28 S. W. Rep., 842.

²⁰ Sheets v. C. & I. C. Ry., 59 N. E. Rep., 154.

²¹ State Board v. M. & O., 16 South. Rep., 489.

²² Ill. Cent. v. Latham, 16 South. Rep., 757.

²³ P., C. & St. L. v. Redding, 39 N. E. Rep., 921.

²⁴ Sheehan v. P. & H., 31 Atl. Rep., 120.

²⁵ Phillips v. N. Y. C., 32 N. Y. S., 393.

²⁶ So. Pac. v. Kennedy, 29 S. W. Rep., 391.

CAR BUILDING.

The Mt. Vernon Car Co., Mt. Vernon, Ill., has received an order for 150 60,000 lbs. standard coal cars from the Cleveland, Lorain & Wheeling road.

The Wells & French Company, of Chicago, is now building 51 ballast cars for the Baltimore & Ohio Southwestern, all of which will be equipped with the Buckeye coupler.

The Philadelphia & Reading has just completed at its shops at Reading, Pa., a sample of a new type of freight car and it is stated that the Receivers have given an order for the construction of 50 additional cars of this pattern. These are the first cars built at the Reading shops for a number of years.

The order of the Union Pacific, Denver & Gulf road for 250 cars recently placed with the Madison Car Co. was made up as follows: 100 32-ft. 60,000-lb. box cars, channel bar trucks and Westinghouse air-brakes; 120 34-ft. standard box cars, Westinghouse air-brakes and automatic couplers, and 30 34-ft. 60,000-lb. standard coal cars.

BRIDGE BUILDING.

Bridgeton, N. J.—The Cumberland County Freeholders have ordered the construction of a new bridge over the Cohansey, at Broad street. Bids will be advertised for. The superstructure is to cost about \$9,500. The South Jersey Traction Co. will bear one-third of the expense.

Hamburg, Pa.—The Berks County Commissioners have been petitioned by property holders along the Schuylkill, near this town, to erect a bridge across that river about two miles south of the present structure at Hamburg. It is estimated that the bridge can be built for \$15,000. The Commissioners have not yet taken any action in the matter.

New Brunswick, N. J.—The Pennsylvania is now preparing to start work on a new bridge across the Raritan River at New Brunswick. Plans have been completed in the office of Chief Engineer Brown, and call for a structure similar to the present bridge. It will be of iron, resting on piers built last year. It will be wide enough for four tracks, but only two tracks will be laid across the bridge until the Pennsylvania completes its four track improvements at New Brunswick.

Ottawa, Ont.—The building of a bridge over the Hurdman road, at the head of the Deepcut, where the Ottawa, Arnprior & Parry Sound crosses, is to be proceeded with at once. The bridge will be of solid masonry, with four steel girders over the roadway. The width of the bridge will be about 50 ft., and the roadway beneath 32½ ft.

South Chicago, Ill.—The Lake Shore & Michigan Southern road is to build a new double track iron draw-bridge over the Calumet River at South Chicago.

Washington County, Md.—The County Commissioners awarded the contract to the Groton Bridge Co., of Groton, N. Y., to erect two iron bridges, one across the Antietam Creek, north of Leisterburg, 60-ft. span, and the other across Big Tonoloway Creek, one mile from Hancock, 70-ft. span, their bid being \$1,404 for both bridges. There were seven bids in all, ranging from \$1,404 to \$1,960.

Youngstown Bridge Co.—The company has been awarded the contract for five bridges on the Cleveland, Akron & Columbus road, consisting of 10 spans, mostly pin-connected trusses, and two plate girder spans. This company also has the contract for 11 spans for the Lake Shore & Michigan Southern, three bridges for the Valley Railway in Ohio, one span for the N. Y., L. E. & W., a 90-ft. girder for the Baltimore City Passenger Railway Co., besides a large amount of structural work.

MEETINGS AND ANNOUNCEMENTS.**Dividends.**

Dividends on the capital stocks of railroad companies have been declared as follows:

Canadian Pacific, 4 per cent. on the preferred stock, payable Oct. 1.

Chicago & Alton, quarterly, \$2 per share, on the preferred and common stock, payable Sept. 3.

Cleveland & Pittsburgh, quarterly, 1½ per cent. upon the guaranteed stock.

Delaware & Bound Brook, quarterly, 2 per cent., payable Aug. 20.

St. Paul & Duluth, 2½ per cent. on the preferred stock, payable Sept. 3.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 21.

Davenport & Rock Island, special, Davenport, Ia., Aug. 15.

Iowa Central, annual, Sept. 6.

Malone & St. Lawrence, special, New York, N. Y., Sept. 12.

New York, Susquehanna & Western, annual, Taylor's Hotel, Jersey City, N. J., Sept. 5.

St. Lawrence & Adirondack, special general, Montreal, Sept. 13.

Toledo & Ohio Central, annual, Toledo, O., Sept. 2.

Wabash, annual, St. Louis, Mo., Sept. 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Master Car & Locomotive Painters' Association will hold its next annual meeting at the Grand Hotel, Cincinnati, Sept. 11, 12 and 13. The programme of this meeting was published in the Railroad Gazette of Aug. 9.

The New England Roadmasters' Association will hold its annual meeting at the Revere House, Boston, on Sept. 18 and 19. The programme was published in the Railroad Gazette of Aug. 9.

The Association of American Locomotive Traveling Engineers will hold its annual convention at the Seventh Avenue Hotel, Pittsburgh, beginning Sept. 10, and lasting till the 14th. C. B. Conger, of Grand Rapids, Mich., is President of the organization, and W. O. Thompson, of Elkhart, Ind., Secretary and Treasurer.

The Society for the Promotion of Engineering Education will hold its second annual meeting at Springfield, Mass., Sept. 2, 3 and 4.

The International Railroad Conference of Young Men's Christian Association is to be held at Clifton Forge, Va., Sept. 13, 14 and 15. Mr. C. J. Hicks, 40 East Twenty-third street, New York City, is Secretary of the Railroad Department of the International Committee. The programme was published in the Railroad Gazette of Aug. 9.

The Roadmasters' Association of America will hold its annual meeting at St. Louis, Mo., Oct. 8.

The American International Association of Railroad Superintendents of Bridges and Buildings will hold its annual meeting at New Orleans, La., Oct. 15.

The American Street Railway Association will hold its annual meeting at Montreal, Que., Oct. 15.

The American Railway Association will hold its fall meeting at New York City, Oct. 16.

The American Association of General Baggage and Ticket Agents will hold its semi-annual meeting at Boston, Sept. 17.

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The Central Railway Club meets at the Hotel Ironclads, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The Northwestern Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street New York, on the first and third Wednesdays in each month at 8 p. m.

The Western Society of Engineers meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Boston Society of Civil Engineers meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The Engineers' Society of Western Pennsylvania meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Association of Engineers of Virginia holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The Engineers' and Architects' Club of Louisville meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The Western Foundrymen's Association meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The Association of Civil Engineers of Cornell University meets on Friday of each week at 2.30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

Western Foundrymen's Association.

There will be no meeting of the Western Foundrymen's Association in August. Arrangements are being made to hold the September meeting in Milwaukee, Wis., particulars of which will be announced later.

Roadmasters' Association of America.

Owing to the Mardi Gras festivities in St. Louis about the 8th of next October, the Association was unable to obtain proper facilities for the annual convention, and the date for the meeting has been changed to October 15, 16 and 17, 1895 in the same city.

Western Society of Engineers.

A special meeting of the Western Society of Engineers was held on Wednesday, Aug. 7, in their rooms in the Monadnock Block, Chicago. The meeting was held to discuss the advisability of withdrawing from the Association of Engineering Societies, and a letter ballot will be sent out about this.

An invitation has been received from the Pioneer Rail Renewing Company, inviting the society to visit its works and see the process. The annual outing, which this year was a trip to Milwaukee, was very enjoyable. The rolling lift bridge, the city's flushing station and the plant of the Edward P. Allis Company were visited in the forenoon, and Pabst's brewery was inspected in the afternoon.

National Railroad Master Blacksmiths' Association.

The annual meeting of the association is to be held in the city of Cleveland, O., beginning on Sept. 3, 1895. Papers to be read have been prepared by various committees, as follows: "Axles and Best Methods of Preparing Scrap for, and Manufacturing;" "Springs;" "Hydraulic Forging, Bull Dozer, Forging, Bending and Cutting Machines, Hammer Dies, etc.;" "Electric Welding;" "Tool Steel, Tool Making, Tool Dressing, Tempering of Tools, Uses and Treatment of Low and High Carbon Steel, Self Hardening Steel, its Advantages, etc."

The headquarters of the association will be at the Trevorton Hotel, 52 to 58 Ontario street, where low rates have been secured.

Iron and Steel Institute.

In accordance with previous announcements, the Autumn Meeting of the Iron and Steel Institute (British) will be held at Birmingham on Tuesday, Wednesday, Thursday and Friday, the 20th, 21st, 22d and 23d inst. The following papers have been offered for reading:

1. On the Direct Puddling of Iron. By E. Bonehill (Marchienne-au-Pont, Belgium).
2. On the Production of Iron by a new process. By R. A. Hadfield, Member of Council (Sheffield).
3. On the Thermo-chemistry of the Bessemer Process. By Professor W. N. Hartly, F. R. S. (Dublin).
4. On the Hardening of Steel. By H. M. Howe (Boston, U. S. A.).
5. On the Mineral Resources of South Staffordshire. By H. W. Hughes, Assoc. R. S. M., F. G. S. (Dudley).

6. On the Iron Industry of South Staffordshire. By D. Jones, Secretary of the South Staffordshire Ironmasters' Association (Shifnal).

7. On the Iron Industry of the South of Russia. By George Kamensky, Assoc. R. S. M. (St. Petersburg).

8. On Tests of Cast Iron. By W. J. Keep (Detroit, U. S. A.).

9. On the Analysis of Ferro-chromium. By E. H. Saniter (Wigan).

10. On Small Cast Ingots. By R. Smith-Casson (Birmingham).

11. On the Estimation of Oxide of Iron in Steel. By A. E. Tucker, F. I. C. (Birmingham).

12. On Tests of Cast Iron. By T. D. West (Sharpville, Pennsylvania).

13. On the Use of Nickel in the Metallurgy of Iron. By H. A. Wiggins (Birmingham).

The programme includes visits to industrial establishments in or near Birmingham, receptions, an excursion to Stratford-on-Avon, under the direction of Sir Arthur Hodgson, K. C. M. G., Chairman of the Trustees for Shakespeare's birthplace, an excursion special train to visit the ruins of Kenilworth, and a reception at Warwick Castle by the Earl and Countess of Warwick.

The Interchange Association.

A general meeting of the new Interchange Association was held in Chicago, July 30, 1895. The meeting was called to order by Mr. J. N. Barr, Chairman of the Executive Committee, and the following roads responded to roll call: B. & C. R. & N. B. & M. R., in Nebraska; B. & O. C. B. & Q. C. & N. W. C. C. C. & St. L. C. G. W. C. M. & St. P. C. & W. I. C. B. & N. C. B. & K. C. C. & W. M. D. L. & N. E. J. & E. H. & St. Jo. K. C. St. J. & C. B. Ills. Central; L. S. & M. S.; L. N. A. & C. N. Y. C. & St. L.; P. & W. P. & P. U.; P. R. & N. E. R. I. & P. Valley; Wis. Central, and some others whose names the Secretary did not ascertain.

Mr. Barr explained that the principal business before the meeting was the revision of the Articles of Agreement, in order to put them in permanent shape for the coming year, making such changes as the past year's experience had demonstrated as desirable.

On motion of Mr. Rhodes, duly seconded, the entire agreement was gone over clause by clause, and so amended as to practically include the entire car, with but few exceptions. The agreement is now being printed and copies will be soon ready for distribution. The revised agreement will go into effect Sept. 1, 1895.

Special rules were introduced making the lines handling cars responsible for the loss of the more expensive parts of cars and for repairs improperly made. A new clause limiting the time for presenting bills under the agreement to six months from date of repairs, was also adopted.

Some questions were presented to the meeting regarding differences of opinion in interpreting the Interchange Agreement, and, after a thorough discussion, the following decisions were unanimously rendered by the meeting:

That door shoes, rollers and other castings connected with doors of cars shall be considered and included as body castings.

That in rendering offset bill for repairs made by lines not party to the Association members shall charge the same amount as they were called on to pay.

That repairs to woodwork of doors are not chargeable, as doors, excepting castings attached to same, are excluded under the agreement.

That in lieu of the original bill and defect card required by Article 5, a copy of the item charged on bill and copy of defect card on which original bill is rendered be accepted as voucher for offset bill.

That the combinations of items 1 and 2, 1 and 3, or 2 and 3, which prohibit rendering bills, are understood to apply to combinations of any or all of the items in 1, 2 or 3, and it is not understood that all of the parts mentioned in either one item must be destroyed in combination with any or all of the parts mentioned in another item to prohibit rendering bill.

It was further decided to accept, as originally rendered, decision No. 1, rendered by Executive Committee, Jan. 15, 1893, and which was, by the Association, referred back for reconsideration. The decision referred to reads:

"When cars having wrong repairs are interchanged a defect card shall be required, and that such card shall be a voucher for cost of changing such wrong repair, precisely as is the practice under the regular M. C. B. rules."

The following officers were elected for the ensuing year: J. N. Barr, Chairman; W. H. Lewis, John Mackenzie, G. W. Rhodes, A. M. Waitt, members of the Executive Committee. The meeting was then adjourned, subject to the call of the Chairman.

PERSONAL.

—Mr. W. L. Doyle, formerly Auditor of the Western New York & Pennsylvania, has been appointed General Passenger Agent and Auditor of the Jamestown & Lake Erie road in New York, formerly the Chautauqua Lake road.

—Mr. E. S. Hutchins who has just been appointed Freight Claim Agent of the Great Northern, was formerly Freight Claim Agent of the Chicago Great Western, going to the Great Northern company in February last. Since that time he has acted as auditor of freight receipts of the Great Northern.

—Mr. J. A. Fillmore's reported promotion from the General Superintendency of the Southern Pacific to the office of General Manager turns out to be premature. No appointment has been made so far, and, as intimated last week, Mr. Towne's successor as General Manager is not likely to be decided upon until Mr. Huntington reaches the Pacific Coast, probably in September.

—Mr. C. C. Harvey, President of the New Orleans & North Eastern; the Vicksburg, Shreveport & Pacific, and the Alabama & Vicksburg roads, announces that he will hereafter make his headquarters at New Orleans, La., and the other general officers now stationed at Cincinnati will also be transferred to New Orleans, about Sept. 1. This change of general offices is made advisable by the separation of these three roads from the Cincinnati Southern and Alabama Great Southern, all of which have heretofore been operated as the Queen & Crescent route.

—Mr. W. C. Edes, who has long been the Chief Locating Engineer of the Southern Pacific Railroad, has been appointed Chief Assistant Engineer of the San Francisco & San Joaquin Valley road, which proposes to build a new line down the San Joaquin Valley, through which already extend three lines of the Southern Pacific. Mr. Edes is a graduate of the Massachusetts Institute of Technology, and has been an engineer on the Southern Pacific for about 16 years. He has been nearly all that time engaged on locating work, surveying most of the important lines built by the Southern Pacific in that time, and has shown a peculiar adaptability for this picking out the most favorable routes. He located the Coast Division of the Southern Pacific now building south of

San Luis Obispo, one of the heaviest pieces of construction work undertaken by the Southern Pacific in many years. He also located the West Side Line of the Southern Pacific in the San Joaquin Valley to Los Banos, and had charge of the construction of that line and many other shorter lines.

—General Henry L. Abbot, Corps of Engineers, U. S. A., was retired for age this week. General Abbot entered the Military Academy from Massachusetts in 1850, graduated into the engineers and has been an officer of that corps ever since. His lineal rank in the corps is colonel and he is a brevet brigadier-general in the regular army. In the volunteer service he reached the lineal rank of colonel and the brevet rank of major-general. As an engineer officer he has made a distinguished career, having become known to the profession many years ago by his studies, in co-operation with Humphreys, of the regimen of the Mississippi River, and having held important positions ever since the war. During the war he served with troops, in the volunteer service, with great distinction. He was seven times brevetted for good service in battles and sieges and "during the war." He was well known in war times as the colonel of the First Connecticut Artillery, a regiment which won its place in history. His retirement promotes Lt.-Col. Hains to be Colonel; Major Ludlow to be Lieutenant Colonel, and Captain Willard to be Major. The Board of Ordnance and Fortifications, in its latest report, says: "Gen. Abbot has been a member of the Board since its organization, and has contributed probably as much as any officer in the army to the development of a system of defense for the United States."

ELECTIONS AND APPOINTMENTS.

Cleveland & Mahoning.—At the annual meeting of the stockholders at Cleveland, O., Aug. 7, Stevenson Burke, Charles C. Hickox and C. L. Murley were elected directors for three years. The directors subsequently elected Stevenson Burke President; E. R. Perkins, Treasurer; and E. E. Poppleton, Secretary.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Chataugay & Northern.—The contract for the first section of this road has been given out this week, the contractors being Messrs. Stewart, Howard, Lemay and Murphy. This section includes 12 miles of road from Montreal to Bout Le l'Isle. The engineers have just completed the location, and the contractors will now begin construction immediately. J. P. Mullarkey, Notre Dame street, Montreal, is Secretary.

Cleveland, Cincinnati, Chicago & St. Louis.—This company is understood to be preparing plans to build a branch from a point on this line, near Cleveland, O., to reach the new works of the Johnson Steel Co., at Lorain. A line of about 15 miles will be necessary, from near Rocky River, a station west of Cleveland. At present the chief rail connection of the Johnson Co., is the New York, Chicago & St. Louis which passes through the town and a new branch of the Cleveland, Akron & Columbus into Cleveland, also reaches the works. The construction of the branch by this company will give the works an outlet to the southwest.

Gloversville & Broadalbin.—David H. Lewis, of Tribes Hill, N. Y., has been awarded the contract to furnish the new road, extending from Broadalbin to Gloversville, N. Y. Heretofore the work on the road has been done by day laborers under the supervision of Chief Engineer J. W. Cleveland. Mr. Lewis expects to have the road entirely completed by Oct. 1. He will put 250 laborers at work at once.

Iron Mountain.—The grading was commenced on this road to Shasta County, Cal., on Aug. 1, and the line will be immediately completed to the Sacramento River. The distance between that point and Iron Mountain is 11 miles. The rails have all been purchased and will be delivered as soon as needed. The road has heavy grades, 198 ft. to the mile and a maximum curvature of 36 deg. The Chief Engineer is M. M. O'Shaughnessy, whose office is in the Crocker Building, San Francisco.

Monterey, Mineral & Terminal.—It is announced in a press dispatch from the City of Mexico that this company has formulated plans to build about 40 miles of additional railroad in the vicinity of Monterey, Mexico. Within a few months the company has completed 20 miles of belt line at Monterey, connecting various smelters and other important plants at that city with the Monterey & Mexican Gulf Railroad. The control of the property is held in Baltimore, the local manager being Mr. J. A. Robertson, General Manager of the Monterey & Mexican Gulf.

National Tehuantepec.—A dispatch from the City of Mexico, states that the Mexican Government announces that it has agreed on a basis of a contract with Frederick H. Cheeswright, a member of the Institute of Civil Engineers of London, for the entire equipment of the Tehuantepec Railway and the construction of terminal works at both the Atlantic and Pacific ends.

New Roads.—A local company is being organized to build a short railroad from the town of Bryan, Tex., south, to a connection with the Gulf, Colorado & Santa Fe, at Clay City, the distance being about 10 miles. Large subscriptions to the capital stock of the company are reported, and it is stated that there is every chance that the project will be carried out. W. A. Saunders is acting as President, and Malcolm Carnes as Secretary of the provisional corporation.

B. B. Cain and L. M. Clark, of Tyler, have appeared before the Texas Railroad Commissioners and asked for authority to issue bonds on a proposed railroad out of Tyler, Tex., in the direction of Alexandria, La.

The survey has been completed for a five mile road from Vulture station on the Santa Fe, Prescott & Phoenix Railroad to the Castle Creek hot springs, 60 miles north of Phoenix, Ariz. The main promoter of the road is the territorial delegate to Congress, N. O. Murphy, owner of the springs.

The firm of Fowler Bros., located at Phoenix, Ariz., has recently secured a charter for a railroad west of that town, and they propose to at once begin the construction of a road to extend 18 miles from Phoenix. It is stated that actual work of construction will begin during October.

Rochester & Southern.—This branch of the Lehigh Valley, extending from Honeoye Falls, N. Y., south to Hemlock Lake, a distance of about 15 miles, is now completed and regular trains will shortly be put on. The road connects at Honeoye Falls with the branch of the Lehigh Valley running into Rochester. The contractors

met with serious difficulty on the last section of the line near Hemlock Lake, which delayed the work more than three weeks. About 4½ miles from the lake a bog was reached which, though not more than 150 ft. long, required something like 25,000 cu. yds. of gravel before a solid roadbed was secured on which to put down the ties and rails.

St. Louis, Vandalia & Terre Haute.—An important improvement, considerably shortening the line, has just been completed at Cutler, Ind., a few miles southwest of Logansport. The work is practically a cut-off and has been carried on at a cost of about \$50,000. Eight bridges of some size, two miles of curvature and a very heavy grade, made the old line expensive to operate and these have all been done away with by the construction of the new cut-off. The town of Cutler is now a mile distant from the main line.

Toledo, Ann Arbor & Michigan.—The contract was recently let for building a short line from Hamburg to Hamburg Junction, Mich. At present the tracks of the Grand Trunk are used between these points, about five miles, and with the building of this section the company will secure a through track of its own from Toledo to Frankfort on Lake Michigan. Drake, Stratton & Co. of Philadelphia have the contract for building the line and are to complete the work as promptly as possible. The construction of the line will involve considerable heavy grading.

Union Pacific, Denver & Gulf.—Trains are now running on the new connection of this company between Trinidad and Walsenberg, Col., the first regular trains having been put on this division on Aug. 3. This line is a section of the work put under contract early in the summer, when the Receiver proposed to build an independent line between Trinidad and Pueblo. In carrying out this plan two pieces of new road have been constructed, one section of 7½ miles from a point just north of Trinidad to Forbes Junction and the second section from Acme Junction to Walsenberg, 20 miles. A connection between Forbes Junction and Acme Junction is made by coal mine branches which have been in operation for some years. After this much of the new line had been placed under contract, the Receiver made a new agreement with the Denver & Rio Grande to continue the use of the tracks of that company into Pueblo, Col., north of Walsenberg. Previously the Denver & Rio Grande tracks had been used all the way from Trinidad to Colorado but hereafter the connection will be made at Walsenberg. A detailed account of the incident was published in the *Railroad Gazette* of June 7 last.

Washburn, Bayfield & Iron River.—A company of this name filed articles of incorporation at Madison, Wis., last week to build a line from Bayfield on Lake Superior, southwest to Iron River in the northern division of Michigan, a distance of about 70 miles. Several other companies have been organized in Wisconsin within the last year or two, to build a road over practically the same route, but so far no one of them has been able to actually start work on the road.

Wheeling & Cleveland.—This company was incorporated in Ohio last week. It proposes to build a road with its southern terminus at Martin's Ferry, in Belmont County, opposite Wheeling, and its northern terminus at Cleveland, and passing through the counties of Jefferson, Harrison, Carroll, Stark, Summit and Portage.

White River Valley.—General Manager J. W. Dean states that the projectors have made arrangements by which the funds for building the line between Newcastle and Meeker, Colo., will be furnished as promptly as necessary and that work will now be commenced on the construction during the present season. The surveys have been made and the right of way secured for 50 miles between these points. The new line, besides opening a good mineral country, will go through the White and Bear River valleys, which will furnish a heavy traffic in cattle and agricultural products.

York Southern.—The work of changing the gage of this road from 3 ft. to standard has now been actually begun, and so far the gage has been changed for nine miles out of York, Pa., to the station of Red Lion. This leaves 25 miles of track on which the gage has yet to be changed, and it is expected that the entire line through to Delta, Md., will be altered during the present month.

GENERAL RAILROAD NEWS.

Brigantine Beach.—This short railroad on the New Jersey coast, which has an unfortunate history since it was built in 1890, is again in trouble. The road has been operated since 1890 by the Atlantic City road, which is controlled by the Philadelphia & Reading, but that company has just given notice that it will no longer run its trains over the line. At present two daily trains are run over the 14 miles of road each way between Brigantine Junction, where it connects with the Atlantic City road and Brigantine Beach, but the property has never paid, and each year it has been necessary to make heavy improvements to the roadbed, to repair the damages caused by the storms during the winter. It is stated that when the Reading road withdraws its rolling stock, the road will probably be operated by the Brigantine Transit Co. An agreement to this end is now being prepared by George A. Cook, the purchaser of the property at the foreclosure sale last spring. He represents the Holland Trust Co., of New York City, the largest holders of the railroad securities.

Davenport & Rock Island.—A circular to the stockholders has recently been issued by President Lauderback announcing that a special meeting of stockholders will be held at Davenport, Iowa, on Aug. 15, at which the stockholders will be asked to approve the transfer of the property to a new company. This new company has been organized to take up the present floating indebtedness and relieve the present company of its financial embarrassments. The present stockholders may subscribe to the securities of the new company proportionate to their present holdings of stock. The creditors have agreed to take this stock at par in lieu of their claims if it is not subscribed by the railroad stockholders. President Lauderback announces that the company earned about \$12,000 last year in excess of all claims. The embarrassment of the company, in spite of this showing, has been caused by the heavy taxes against the company, amounting to over \$165,000 for street improvements. The road lies in three cities, each of which has undertaken costly highway improvements and in addition to the proportion of these taxes which the company has had to bear, it has been compelled to put in new ties and rails and undertake other improvements, amounting altogether to \$131,000. This has created a floating debt which is now about due and some plan is necessary for adjusting the company's finances.

Denver & Rio Grande.—A statement of the earnings of the company for the fiscal year to June 31, is issued this week in advance of the annual report, which is not due until September. The statement follows:

Twelve months ending June 30:	
Gross earn.....	1895. \$6,916,841
Oper. exp.....	1894. 3,977,551
Net earn.....	1895. \$2,939,290
Proportion of fixed charges, taxes, etc.,	1894. 2,415,331

Surplus for the 12 months..... \$523,959

The earnings for June were as follows:

Gross earn.....	1895. \$579,573
Oper. exp.....	1894. 321,173
Net earn.....	1895. \$258,400
Proportion of fixed charges, taxes, etc.,	1894. 193,323
Surplus for the month.....	1895. \$65,077

Duluth & Iron Range.—State Auditor Dunn, of Minnesota, has determined to test the state grant of 200,000 acres already deeded to this road and will bring suit to recover. This will test the company's demand for 400,000 acres additional, which was reported in this column on Aug. 2. There is little doubt that the company will win, and the Auditor's action is not looked upon as sincere, but as having a political object.

Illinois Central.—The company make the following report of its income from traffic for the twelve months ended June 30, 1895 and 1894:

	1895.	1894.	Dec.
Miles oper.....	7,888	2,888	
Gross earn.....	\$19,056,991	\$20,657,464	\$1,600,470
Oper. exp. & taxes.....	13,268,540	14,569,416	1,100,883
Net earn.....	\$5,788,451	\$6,088,048	\$499,587

The gross receipts from traffic for the month of July, 1895, are estimated at \$1,486,903; the receipts for July, 1894, were \$1,212,118, an estimated increase of \$274,785.

Northern Pacific & Montana.—The committee representing the first mortgage bonds of the road reports that of the \$5,631,000 bonds outstanding \$4,057,000 have been deposited under the committee's agreement of Nov. 26 last. The committee has decided to extend the time for depositing the bonds with the Knickerbocker Trust Co., of New York, to Aug. 15.

Kentucky & South Atlantic.—The change of the gage of this road from 3 ft. to standard was completed last week between Mt. Stirling and Rothwell, Ky., 20 miles. The road is operated as a part of the Lexington division of the Chesapeake & Ohio. Now that the line has been made a standard gage road, it is stated that there is some possibility of its being extended to the Emmons coalfields in Morgan County, Ky.

Louisville & Nashville.—The company reports actual general results from operations for the year ended June 30 as follows:

	1891-1895.	Inc. or Dec.
Gross earn.....	\$19,275,994	I. \$30,657
Oper. exp.....	12,277,773	I. 413,938
Net earn. from traffic.....	\$6,998,221	D. \$112,331
Deduct:		
Interest and rent.....	\$5,013,738	D. \$51,539
Taxes.....	569,326	D. 31,033
Total fixed charges.....	\$5,583,064	D. \$82,572
Net earn.....	\$1,415,157	D. \$29,759
Income from investments.....	\$363,273	I. 90,985
Total.....	\$1,778,430	I. \$61,226
Deduct:		
Loss on Georgia Railroad.....	\$108,261	I. \$83,180
Loss on other roads.....	90,025	D. 49,904
Sinking fund payments.....	175,000	I. 175,000
Unfunded discount.....	6,887	I. 6,887
Balance advances to S. & N. Ala.	637,669	I. 697,669
Total deductions.....	\$1,077,845	I. 913,132
Surplus.....	\$700,585	D. \$351,906

Marietta & North Georgia.—No bid was received for this property, which was offered for sale at Marietta, Ga., on Aug. 10, under order of the Federal Court.

New York, Lake Erie & Western.—The modifications in the plan of reorganization, agreed upon by J. P. Morgan & Co., have been assented to by the American interests. It is now conceded that the original plan of reorganization cannot be carried out. The modifications agreed upon have not been made public, pending the approval of the changes by the London interests. The new terms will probably be made public in September. In the meantime, nothing definite is known by the public, but those who engage in guessing in such matters substantially agree that the scheme will involve the issue of \$35,000,000 prior lien bonds and \$140,000,000 general lien bonds, to cover the entire property from New York to Chicago. The general lien bonds will bear a graduated rate of interest, beginning at 3 per cent. and increasing in time to 4 per cent. Assessments will be levied of \$12 a share on the common and \$8 a share on the preferred stock.

Norfolk & Carolina.—The contract for constructing the wharves and warehouses at Pinner's Point, Norfolk Harbor, for the Norfolk & Carolina road, has been awarded to the New York Dredging Co. at \$75,000. The entire work is to be completed by January.

Northern Pacific.—President Brayton Ives has renewed his suits to secure the dismissal of the present Receivers of the company. It will be remembered that his previous application to have the Receivers now operating the railroad dismissed by the court was denied by Judge Jenkins, of the United States Circuit Court, at Milwaukee, who dismissed all the charges made by President Ives in his suit against the Receivers, referring for a hearing only one specification made in the charges—that against the former President, Mr. Henry Villard, in regard to his interest in the Northern Pacific & Manitoba road when it was leased to the Northern Pacific during Mr. Villard's administration. Mr. Ives' new petition is made before the United States Court at Seattle, Wash. He seems to place his chief hope of success on the allegation that Judge Jenkins is without jurisdiction in the matter, the Northern Pacific operating no line in the jurisdiction of his court. The petition has been set for a hearing late this month.

Oregon Railway & Navigation Co.—In the United States Court at Portland, Ore., the suit of the Farmers' Loan & Trust Co. against the company for foreclosure of a mortgage amounting to \$12,500,000 and interest from December, 1894, Judge Bellinger has allowed the bill, and the decree of foreclosure will be entered. The suit was brought on June 25, 1894, on account of the failure

of the Union Pacific, which then controlled the Oregon Railway & Navigation Co., to pay interest amounting to about \$1,000,000.

Oregon Short Line & Utah Northern.—A decision was made in the United States Circuit Court at Helena, Mont., last week, by Judge Hiram Knowles, providing for the foreclosure sale of the road at the end of 30 days if in the meantime the various sums of interest due on the consolidated bonds are not forthcoming. The decree is confirmatory of the order of the court in Oregon.

Port Royal & Western Carolina.—The United States Circuit Court at Charleston, S. C., on Aug. 9, is sued an order that the road be sold at foreclosure at Greenwood, S. C., on Oct. 17. The decision was made in a suit brought by Charles Phinizy and Alfred Baker, the Augusta & Savannah and Central Trust Co., of New York City. The property to be sold includes the main line of the Port Royal & Western Carolina from Greenwood to Spartanburg, S. C., 69 miles; the Augusta & Knoxville, from Augusta to Greenwood, 68 miles; the Greenville branch, from Lawrence to Greenville, 37 miles, and the branch from McCormick to Anderson, 59 miles. These lines were formerly operated as part of the Central of Georgia system, but a year or so ago, after a contest by the minority security holders, a separate Receiver was appointed, and since then the lines have been operated by J. B. Cleveland as Receiver. At the same time the Port Royal & Augusta was also separated from the other lines of the Central of Georgia and it has been operated independently by Mr. J. H. Averill as Receiver, but that property is now involved in the present decision of Judge Simonton.

Silver City & Northern.—At a special meeting of the stockholders of the company and of the Southwestern Coal & Iron Co. in New York, on Aug. 13, it was decided to increase the first mortgage of \$100,000 of the Iron Company, which owns the railroad, to \$180,000. This will enable the Iron Company to take up all of its floating debt, and will leave a working capital of about \$40,000. The additional mortgage has already been sold to the present stockholders of the Iron Company's bonds.

South Brunswick Terminal.—This road was sold at Brunswick, Ga., on Aug. 6, under foreclosure proceedings. It was purchased by John B. Curr and Hiram R. Steele, of New York, for \$50,000. The property embraces terminal facilities at South Brunswick, and a line from there to Waynesville, about 20 miles long. It is proposed to extend the line to make important intersections.

St. Louis, Cape Girardeau & Southwestern.—The contest for the control of this property between the Receivers appointed by different courts in Missouri was decided in the Iron County Circuit Court last week in favor of Eli Klotz, who was appointed Receiver on behalf of interests alleged to be identified with the Missouri Pacific. It is stated, however, that pending an appeal, the property will continue to be operated by Louis Houck, who was appointed Receiver by another county court soon after the original appointment of Mr. Klotz. Mr. Houck is President of the company, having held that office since the road was built and being practically its projector. He claimed that there was no necessity for the appointment of a Receiver when Mr. Klotz's appointment was announced, but to prevent the control passing out of his hands, he made application to another county court for his appointment as Receiver and was successful in securing an order declaring the original appointment of Mr. Klotz as Receiver to be illegal. This order is now rescinded, but no change will be made in the administration of the property until a decision is made by the Supreme Court of the State.

Texas Trunk.—This property was sold at Dallas, Tex., on Aug. 6 and was purchased by Mr. H. S. Lovett for New York interests, the purchase price being \$250,000. The road is about 50 miles long, extending from Dallas to Kaufmann and Cedar City, Tex. It reaches no important towns and the country through which the road extends is reached by more important railroads which lie both to the north and south of the Texas Trunk. The road has been in the hands of a Receiver since 1891 and the roadbed is in poor condition. Most of the rolling stock which the company has been using is leased from C. P. Huntington, and it is stated, that he is the actual purchaser of the property.

TRAFFIC.

Traffic Notes.

The Southern Pacific has made large reductions in the freight rates on fruit from San Francisco to Oregon points, to compete with the steamships.

A wire cable six miles long and weighing 131,000 lbs. was recently transported from St. Louis to New York, over the Wabash, the Lake Shore and connections.

The Centennial Mill, of Spokane, Wash., recently shipped 50,000 sacks (1,100 tons) of flour to Hong Kong, China. The Northern Pacific got a nice little haul of 400 miles from Spokane to Tacoma.

The railroads entering St. Louis from the east are still unable, after several meetings, to come to any agreement on freight rates for coal to that city. Receiver Peirce, of the Toledo, St. Louis & Kansas City, is said to have refused to join any agreement unless he should be guaranteed 7 per cent. of the traffic. It is said that that road has never yet carried over 2½ per cent.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Aug. 10, amounted to 46,415 tons, against 43,330 tons during the preceding week, an increase of 3,085 tons. The proportions carried by each road were:

Roads.	WEEK TO AUG. 10.		WEEK TO AUG. 3.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	4,003	8.6	4,064	9.4
Wabash.....	5,103	11.0	6,153	14.4
Lake Shore & Mich. South.	5,073	12.3	5,638	12.7
Pitts., Ft. Wayne & Chicago	4,277	9.2	4,368	11.2
Pitts., Cin. Chi. & St. Louis	6,561	13.1	5,779	13.4
Baltimore & Ohio.....	3,421	7.3	3,203	7.2
Chicago & Grand Trunk....	5,927	12.8	4,124	9.5
New York, Chic. & St. Louis	5,797	12.5	5,430	12.5
Chicago & Erie.....	4,537	9.7	3,641	8.4
C., C., C. & St. Louis.....	1,626	3.5	1,005	2.3
Total.....	46,415	100.0	43,330	100.0

Of the above shipments 1,457 tons were flour, 15,274 tons grain and mill stuff, 10,999 tons cured meats, 7,891 tons dressed beef, 2,001 tons butter, 1,382 tons hides, and 4,902 tons lumber.